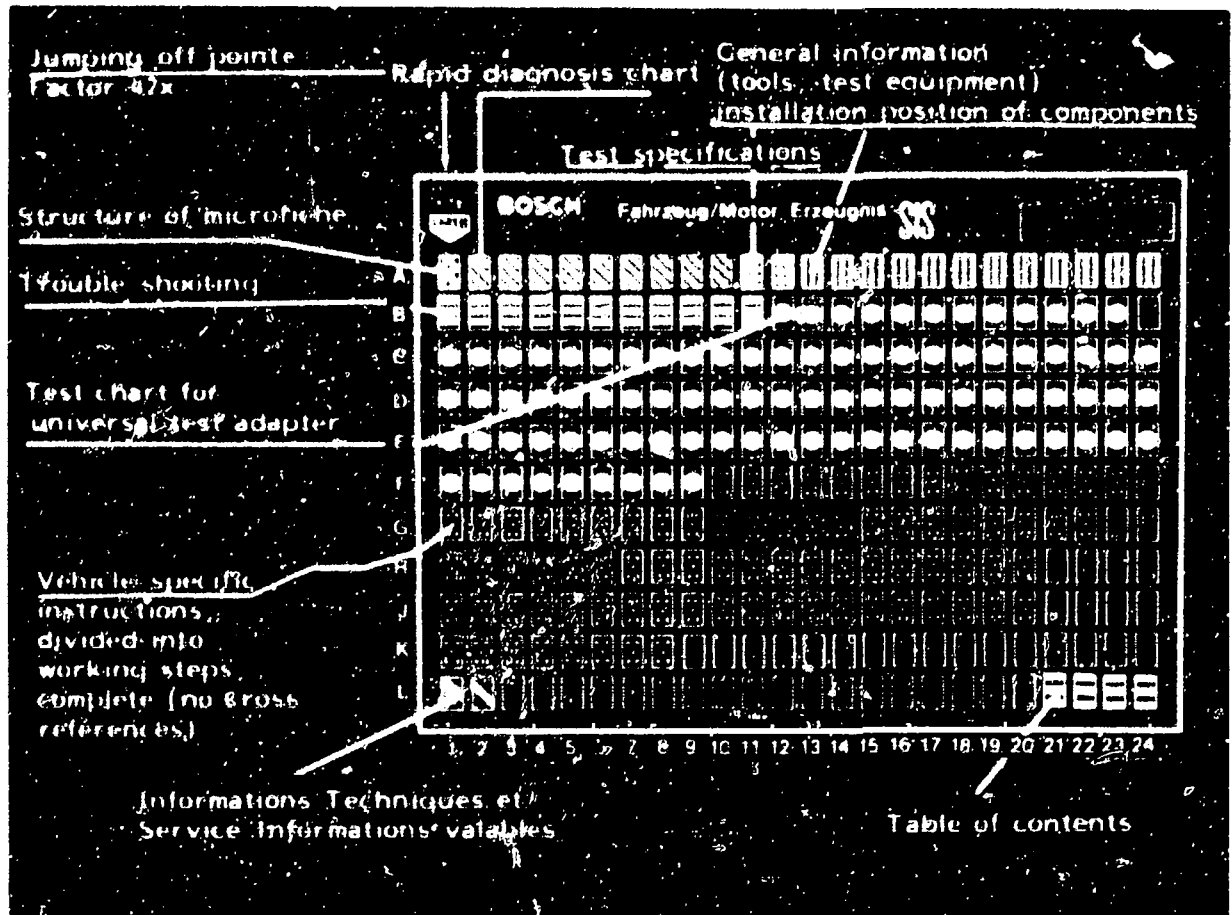


## Structure of microfiche

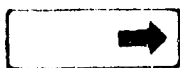


1. Read from left to right
2. Title of microfiche (appears on each coordinate)

<b>E 16</b>	Product/assembly/test step	
	Vehicle/engine	

Coordinate

3. Limits of section



Beginning



Mid-section



End



One-page section

4. Purely vehicle-related passages identified by a vertical bar.

5. References to relevant test steps in test specifications; coordinate e.g. C6

**C 6**

**A 1**

Trouble shooting program



## 1. RAPID DIAGNOSIS CHART FOR UNIVERSAL TEST ADAPTER

The following rapid diagnosis chart makes it possible for the experienced Motronic expert to quickly check the electrical part of the system using the universal test adapter.











The rapid diagnosis chart contains the following information:

- Switch positions on universal test adapter
- Sequence of test steps
- Notes on how to operate the universal test adapter or other components
- Readings on the multimeter and motortester
- References to coordinates of the relevant detailed testing and trouble-shooting program.

If detailed information and instructions are necessary, always proceed according to the trouble-shooting program starting on Coordinate B1.



# Rapid diagnosis chart for universal test adapter

Test step	Switch position		Remarks	Test specifications (reading)	For trouble-shooting see
	V	$\Omega$			Coordinate
1		1	Shift gear to neutral. Ignition off. Disconnect control unit. Measure insulation resistance of engine-speed sensor. Term. 8 against term. 5	<u>Greater than 1M<math>\Omega</math></u>	B 18
2		2	Measure insulation resistance of reference-mark sensor. Term. 25 against term. 5	<u>Greater than 1M<math>\Omega</math></u>	B 20
3		3	Measure winding resistance of engine-speed sensor. Term 8 against term 27	<u>0.6...1.6 k<math>\Omega</math></u>	B 22
4		4	Measure winding resistance of reference-mark sensor. Term. 25 against term 26	<u>0.6...1.6 k<math>\Omega</math></u>	C 3
5		5	Measure resistance of engine temperature sensor (NTC II). Term. 13 against term 5	at 15° to 30°C: <u>1.45...3.3 k<math>\Omega</math></u> (depends on temperature)	C 7
6		6	Measure resistance of air temperature sensor (NTC I). Term. 22 against term. 5	at 15° to 30°C: <u>1.45...3.3 k<math>\Omega</math></u> (depends on temperature)	C 9
7		7	Measure resistance. Lead for map switch-over. Term. 10 against term. 5	General: $\infty \Omega$ Switzerland: less than 15 $\Omega$	C 11
8		8	Deleted	---	---
9		9	Accelerator in rest position. Measure resistance of idle contact. Term 2 against term. 5	<u>Less than 15 <math>\Omega</math></u>	C 13
10		10	Accelerator in full-load position. Measure resistance of full-load contact. Term. 3 against term. 5	<u>Less than 15 <math>\Omega</math></u>	C 17

**A3**

Rapid diag. ch. for univ. test adapter  
Alfa Romeo Quadrifoglio


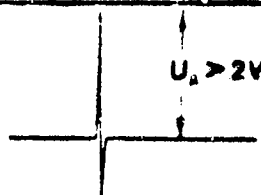


**A4**

Rapid diag. ch. for univ. test adapter  
Alfa Romeo Quadrifoglio



Rapid diagnosis chart for universal test adapter (continued)

Test step	Switch position		Remarks	Test specifications (reading)	For trouble shooting see Coordinate
	V	$\Omega$			
11	↓	11	Measure resistance. Ground term. 16 against term. 5	Less than 15 $\Omega$	D 19
12	↓	12	Measure resistance. Ground term. 17 against term. 5	Less than 15 $\Omega$	C 21
13	↓	13	Measure resistance. Ground term. 19 against term. 5	Less than 15 $\Omega$	C 23
14	↓	14	Deleted	---	----
15		15	Deleted	---	----
16	1	15	Measure signal with oscilloscope. Engine-speed sensor term. 8 against term. 27. Shift gear to neutral and crank engine.		D 1
17	2	15	Measure signal with oscilloscope. Reference-mark sensor term. 25 against term. 26. Shift gear to neutral and crank engine.		D 7
18	3	15	Deleted	---	----
19	4	15	Deleted	---	----
20	6	15	Measure voltage at relay 2 (main relay). Term. 35 against term. 5	10...15 V	D 13
21	7	15	Measure voltage at relay 2 (main relay). Term. 18 against term. 5	10...15 V	D 15
22	5	15	Ignition off. Connect control unit. Ignition on. Measure ignition signal with oscilloscope. Shift gear to neutral and operate starting motor. Control unit, ignition output stage term. 1 against term. 5		D 17

**A5**

Rapid diag. ch. for univ. test adapter  
Alfa Romeo Quadrifoglio



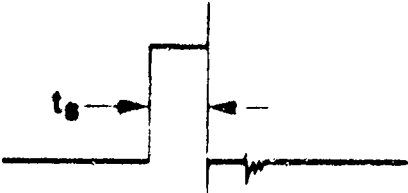
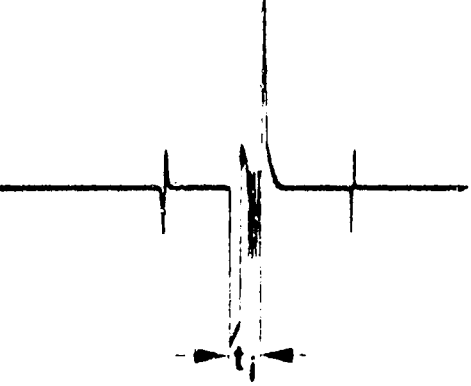
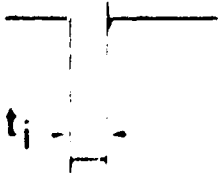
**A6**

Rapid diag. ch. for univ. test adapter  
Alfa Romeo Quadrifoglio





Rapid diagnosis chart for universal test adapter (continued)

Test step	Switch position		But-ton	Remarks	Test specifications (reading)	For trouble shooting see Coordinate
	V	$\Omega$				
23	8	15		Measure voltage at control unit. Term. 9 against term. 5	Greater than 8 V	D 19
24	9	15		Measure voltage at air-flow sensor. Term. 7 against term. 5 Air-flow sensor flap in rest position: Air-flow sensor flap open:	150...250 mV Greater than 8 V	D 21
25	10	15		Deleted	---	---
26	11	15		Deleted	---	---
27	12	15		Measure voltage. Starting signal term. 50. Term 4 against term. 5	8...15 V	D 23
28	13	15		Test dwell-period signal $t_s$ from control unit with oscilloscope. Term. 21 against term. 5 Shift gear to neutral and crank engine.		E 1
29	14	15		Test injection signal $t_i$ from control unit with oscilloscope. Term. 14 against term. 5. Shift gear to neutral and crank engine.		E 3
30	14	15	T1	As 29, but duration of injection becomes slightly longer after pressing button (NTC 11, cold).		E 5
31	15	15		As test step 29, but term. 15 against term. 5		E 7
32	16	15		Measure injection signal $t_i$ from control unit with oscilloscope. Term. 11 against term. 5. Shift gear to neutral and crank engine.		E 9

**A7**

Rapid diag. ch. for univ. test adapter  
Alfa Romeo Quadrifoglio



**A8**

Rapid diag. ch. for univ. test adapter  
Alfa Romeo Quadrifoglio



# Rapid diagnosis chart for universal test adapter

Test step	Switch position V	But-ton	Remarks	Test specifications (reading)	For trouble-shooting see coordinate
33	17	15	Connect pump relay. Measure voltage at pump relay ter. 20 against term. 5. Ignition on	10...15 V	E 11
34	17	15	Measure voltage. Shift gear to neutral and operate starting motor. Control unit, pump control active. Term. 20 against term. 5	max. 4 V	E 13
35	17	15	T3 Ignition off. Connect pressure gauge. Ignition "ON". Press button T3, read off fuel pressure.	2.8...3.2 bar	E 15
36	17	15	Connect motortester. Connect CO analyzer. Let engine run at normal operating temperature. Test idle speed and CO.	800...900 min <sup>-1</sup> 0.5...1.5 % CO	E 21
			T2 As above, readings unchanged.		
37	17	15	Let engine run. Test spark advance at idle speed. Important! Idle speed must be between 800 and 900 min <sup>-1</sup> , otherwise different spark advance will be indicated.	General: 7°...13° Switzerland: -3°...+3°	F 1
			T6 Test spark advance at full load. Engine at normal operating temperature. Set engine speed to 3500 min <sup>-1</sup> and only then press T6 (full-load button).	14°...24° at engine speed 3500 min <sup>-1</sup>	
38	17	15	Dwell angle (measured at ignition coil) at idle speed	8°...15°	F 3
			Dwell angle at 3000 min <sup>-1</sup>	25°...40°	
39	17	15	T5 Keep engine speed 2000 min <sup>-1</sup> constant. Press button T5. Injection signals stop and resume again at approx. 1200 min <sup>-1</sup> .	Engine "hunts"	F 5
40	20	15	Measure voltage at relay 3 (camshaft energization) between term. 31 and term. 5. Idle speed.	10...15 V	F 7
			T6 Set engine speed to 2000...3000 min <sup>-1</sup> and press button T6. At idle speed press button T6: engine runs rough or stops.	max. 4 V	

A9

Rapid diag. ch. for univ. test adapter

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A10

Rapid diag. ch. for univ. test adapter

Alfa Romeo Quadrifoglio



## 2. TEST SPECIFICATIONS

The resistance values apply without test adapter.

<u>Idle speed</u>	<u>800...900 min<sup>-1</sup></u>
<u>Exhaust-gas setting:</u>	
CO concentration with engine at normal operating temperature	<u>0.5...1.5 % by vol. CO</u>
<u>Fuel pressure:</u>	<u>2.8...3.2 bar</u>
Fuel pump delivery	<u>at least 750 cm<sup>3</sup>/30 s</u>
See equipment and autodata microfiches for settings for ignition, valve clearance and other engine data.	
<u>Solenoid-operated injection valve:</u>	
Electrical internal resistance	<u>2...3 <math>\Omega</math></u>

**B7**

<u>Air-flow sensor</u>	
Resistance value between terminals 6 and 7:	<u>8 <math>\Omega</math>...2500 <math>\Omega</math></u>
terminals 6 and 9:	<u>(air-flow sensor flap deflected) 500 <math>\Omega</math>...1100 <math>\Omega</math></u>
<u>Auxiliary-air device:</u>	
Electrical internal resistance	<u>25 ... 60 <math>\Omega</math></u>

**B5**

Temperature sensor I (NTC I air):

Electrical internal resistance

at + 15°C...+30°C: 1.45...3.3 k $\Omega$

measured at air-flow

sensor between terminals

22 and 6 at +80°C: 280...360  $\Omega$

Temperature sensor II (NTC II coolant):

Electrical internal resistance

at + 15°C...+30°C: 1.45...3.3 k $\Omega$

at + 80°C: 280...360  $\Omega$

Engine-speed sensor and reference-mark sensor

Electrical internal

resistance 0.6...1.6 k $\Omega$

Throttle-valve switch

Resistance of idle

contacts (terminals 2 and 43):

0  $\Omega$

Full-load contacts

(terminals 3 and 43):

0  $\Omega$

Solenoid-operated valve

for camshaft energization

Electrical internal

resistance

approx. 12  $\Omega$

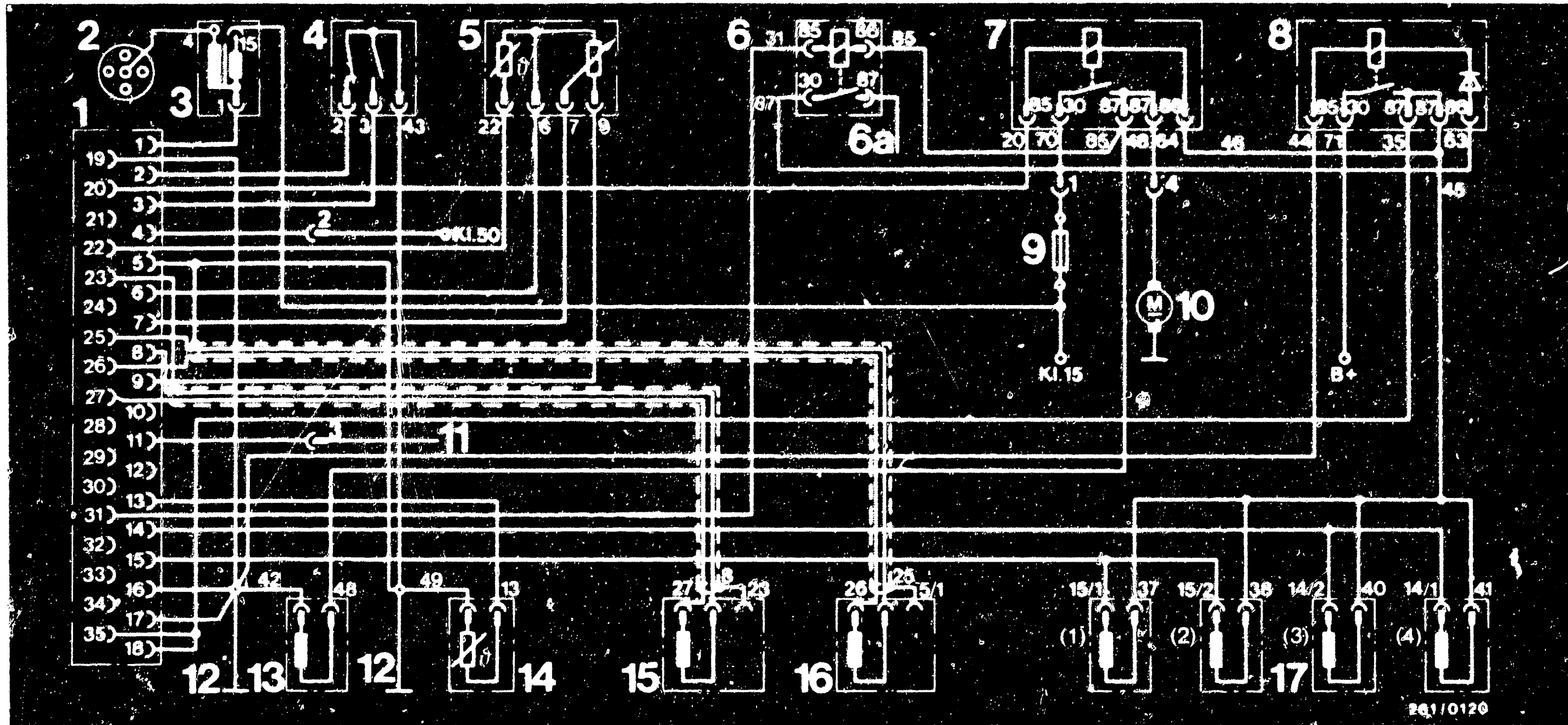
**B 7**

**B 9**

**B 7**

**B 7**





261/0120

### 3. ELECTRICAL TERMINAL DIAGRAM

1 = 35-pin plug  
 2 = High-voltage distributor  
 3 = Ignition coil  
 4 = Throttle-valve switch  
 5 = Air-flow sensor  
 6 = Relay 3 (camshaft energization)

6a = To solenoid-operated valve  
 7 = Relay 1 (pump relay)  
 8 = Relay 2 (main relay)  
 9 = Fuse No. 8  
 10 = Fuel pump  
 11 = To consumption meter

12 = Ground terminals on auxiliary-air device and inlet valve cover  
 13 = Auxiliary-air device  
 14 = Temperature sensor NTC II (coolant)  
 15 = Engine-speed sensor  
 16 = Reference-mark sensor  
 17 = (1, 2, 3, 4) = injection valves  
 Cyl. 1, 2, 3, 4

**A13**

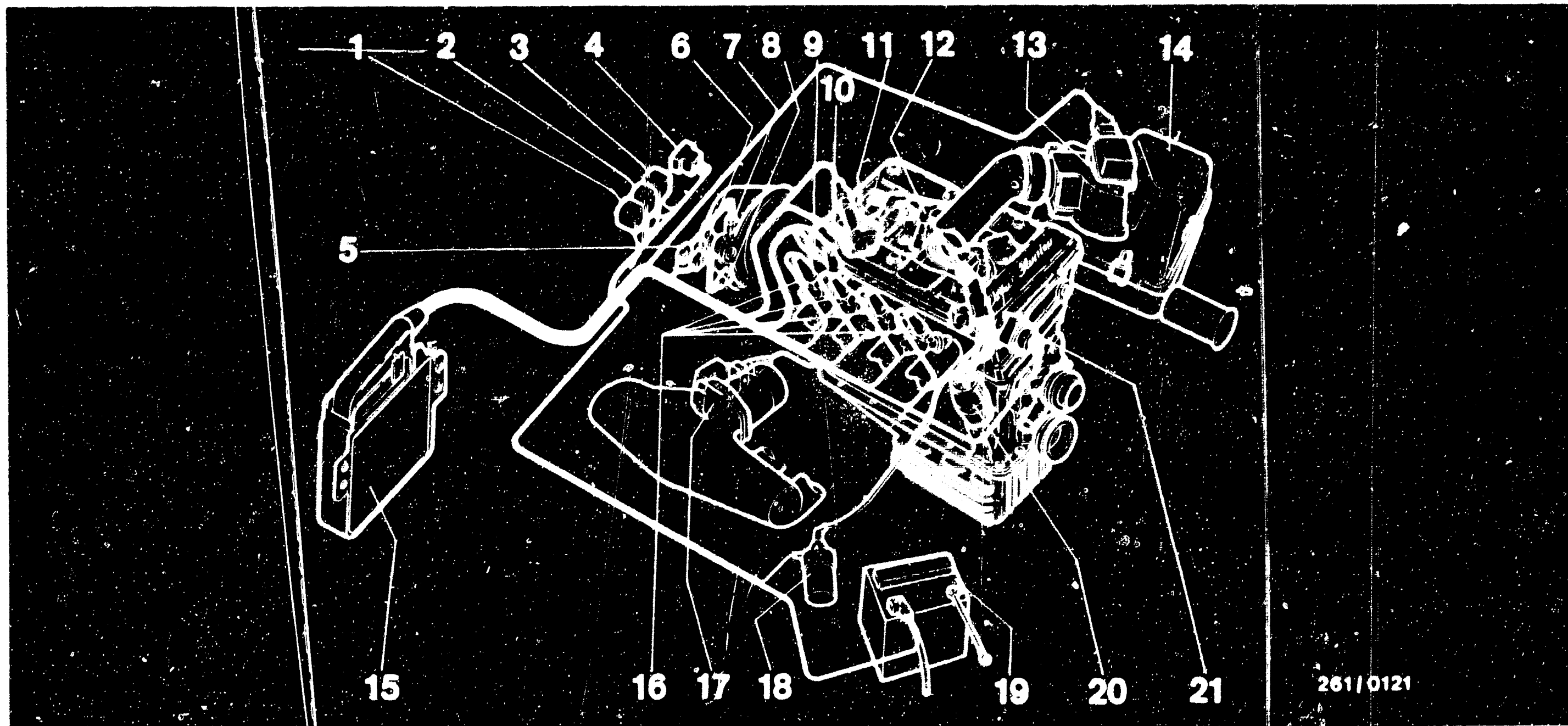
Electrical terminal diagram  
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**A14**

Electrical terminal diagram  
 Alfa Romeo Quadrifoglio





261/0121

#### 4. ELECTRICAL WIRING DIAGRAM

- |  |                                  |  |
|--|----------------------------------|--|
| 1 = Relay 1 (pump relay)                         | 8 = Reference-mark sensor        | 17 = Throttle-valve switch                             |
| 2 = Relay 2 (main relay)                         | 9 = Ground terminals             | 18 = Ignition coil                                     |
| 3 = Relay 3 (camshaft energization)              | 10 = Temperature sensor (engine) | 19 = Battery   |
| 4 = Plug-in connection to vehicle wiring harness | 11 = Auxiliary-air device        | 20 = High-voltage distributor                          |
| 5 = Plug-in connection for engine-speed sensor   | 12 = Spark plug                  | 21 = Solenoid operated valve for camshaft energization |
| 6 = Plug-in connection for reference-mark sensor | 13 = Air-flow sensor             |  |
| 7 = Engine-speed sensor                          | 14 = Air filter                  |  |
|  | 15 = Control unit                |  |
|  | 16 = Injection valves            |  |

**A15**

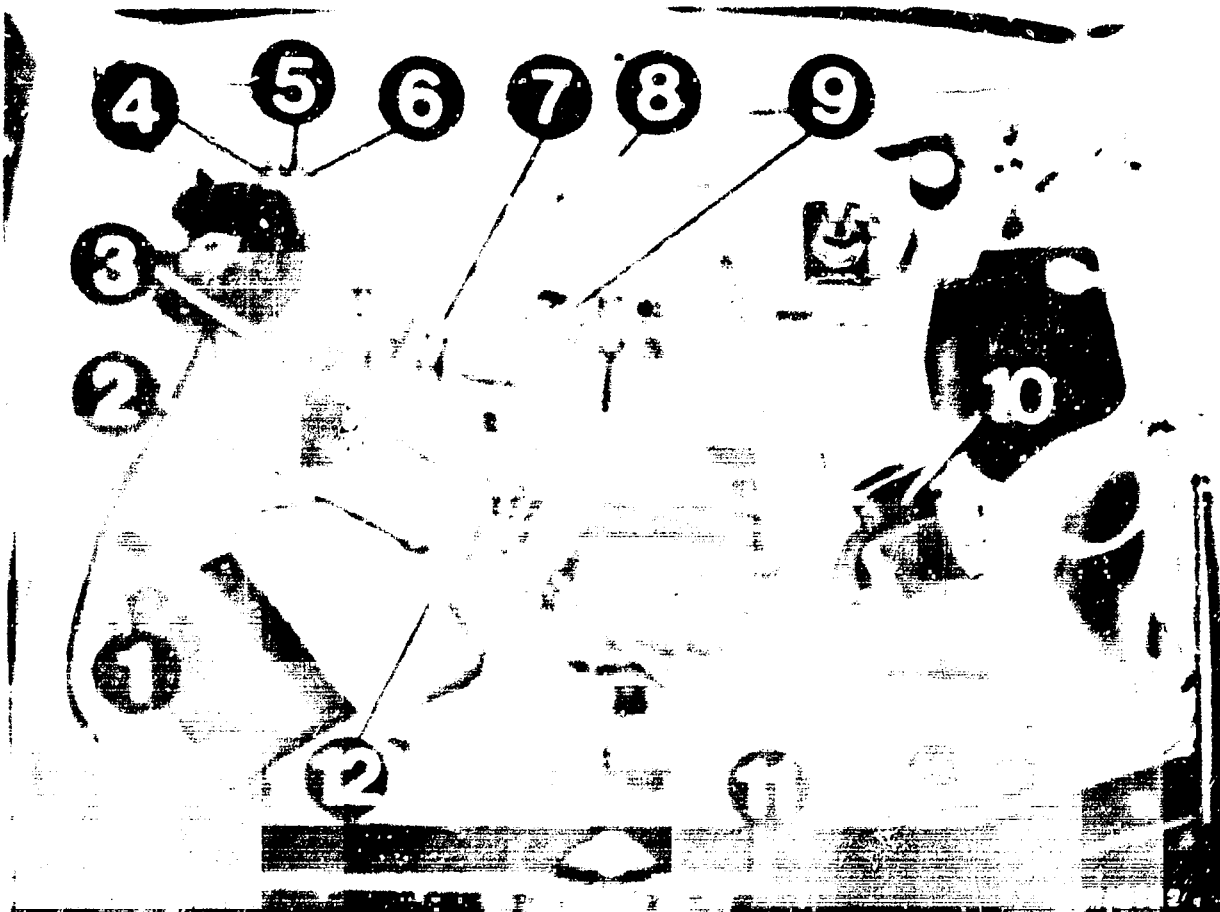
Electrical wiring diagram  
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**A16**

Electrical wiring diagram  
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## 5. INSTALLATION POSITION OF COMPONENTS

- 1 = Ignition coil
- 2 = Pressure regulator
- 3 = Solenoid-operated injection valve
- 4 = Relay 1 (pump relay)
- 5 = Relay 2 (main relay)
- 6 = Relay 3 (camshaft energization)
- 7 = Throttle-valve switch
- 8 = Plug-in connections for sensors
- 9 = Auxiliary-air device
- 10 = Air-flow sensor
- 11 = Electromagnet for camshaft energization
- 12 = High-voltage distributor



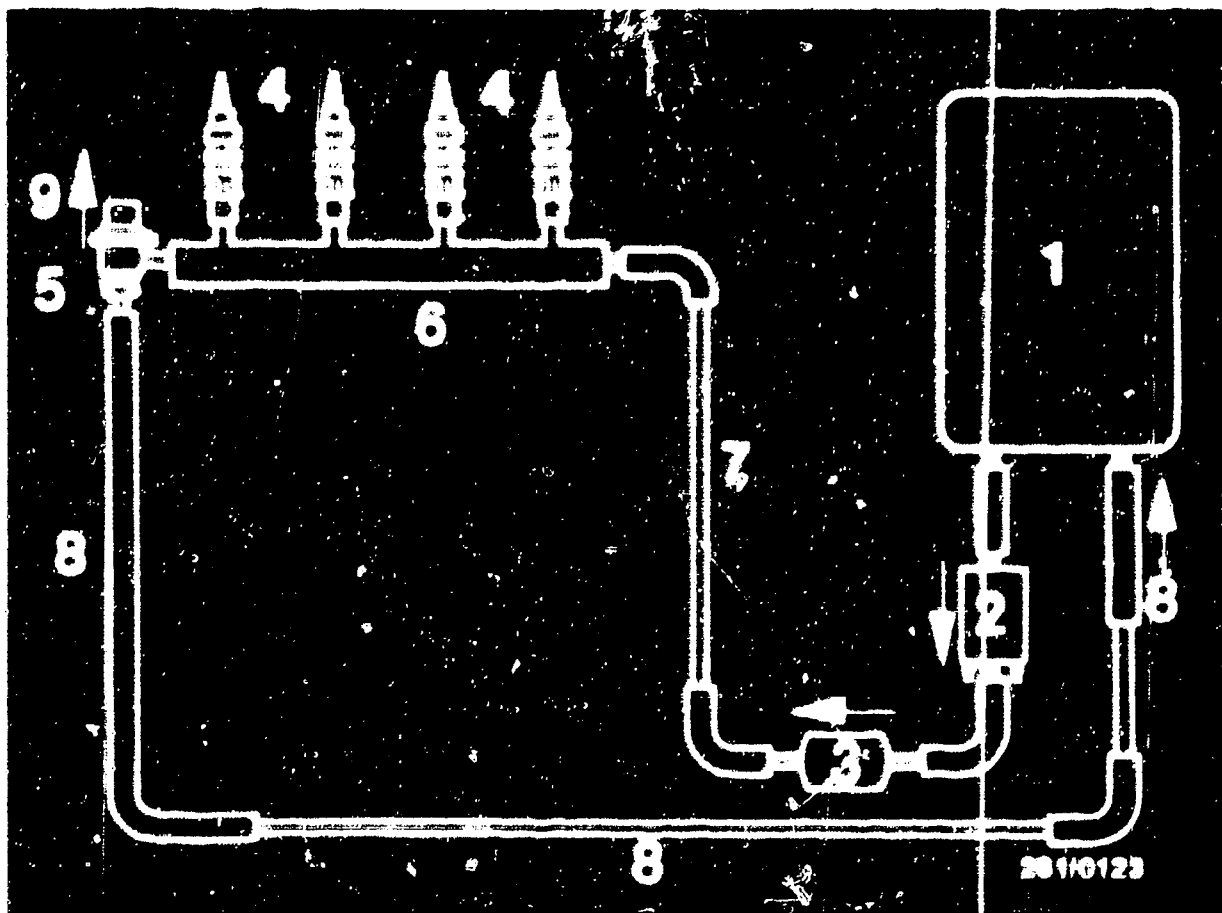
## Installation position of components (continued)

The indications "right" and "left" always refer to the forward direction of travel. Listed in the following are components which are not visible in the picture.

Reference-mark and engine-speed sensors:	In starting-motor ring-gear housing on circumference of flywheel ring gear
Control unit:	In glove compartment on right
Temperature sensor I (air):	In air-flow sensor
Temperature sensor II (engine):	On right-hand side of engine between cyl. 3 and 4. Blue plug.
Central ground terminals:	1. Under fastening screws of auxiliary-air device  2. Under a screw of inlet valve cover, near injection valve on cylinder 4.







# 6. DIAGRAM OF FUEL LINES

- 1 = Fuel tank
- 2 = Fuel pump
- 3 = Fuel filter
- 4 = Solenoid-operated injection valves
- 5 = Pressure regulator
- 6 = Fuel-distributor pipe
- 7 = Fuel delivery line
- 8 = Fuel return line
- 9 = To intake manifold

## 7. TEST EQUIPMENT AND TOOLS

<u>Description</u>	<u>Designation</u>	<u>Part No.</u>
Universal test adapter Adapter cable	ETT 018.01	0 684 101 801 1 684 463 124
Motortester	e.g. MOT 002.00 or 200	0 684 000 200
Exhaust-gas analyzer	e.g. ETT 008.02 or ETT 008.03	0 684 100 802 0 684 100 803
Multimeter (analog reading, internal resistance min. 20 k $\Omega$ /V)		Commercially available e.g. type MA 2H from Metrawatt or Chinaglia, Cortina model
Pressure gauge 6 bar  or Pressure tester or Pressure tester (no longer available)	Quality class 1.0 0.1 bar graduations	1 687 231 154  KDJE-P 100  KDEP 1034
Three-way line as connection piece for KDJE-P100 and KDEP 1034		KDJE-P100/13

<u>Description</u>	<u>Part No.</u>
Feeler gauge for measuring the sensor air gaps (up to 1 mm)	Commercially available
Lubricant for engine-speed and reference- mark sensors	Molykote Longterm 2, commercially available
Chassis dynamometer e.g. LPS 96 or LPS 002	0 680 017 001 0 680 100 200
Electric connecting cable (test lead) for direct connection of the components under test, e.g. injection valves	KDJE 7450/70



## 8. IMPORTANT GENERAL INFORMATION

This information must be observed in order to prevent damage to the engine, control unit or ignition coil and for the safety of personnel.

8.1 Never start engine without securely connected battery.

8.2 Incorrect polarity of the supply voltage, e.g. by incorrect connection of the battery or ignition coil, can lead to irreparable damage to the control unit.

8.3 Do not use a fast charger for starting the engine.

Use only a second 12 V battery and jump leads.

Caution! Owing to different requirements of vehicle manufacturers with regard to electronic products we advise you not to use 24 V batteries as an aid for starting. Follow the vehicle owners manual.

8.4 Disconnect the battery from the vehicle electrical system before fast charging.

8.5 When charging the battery in the vehicle or when using a starting aid, follow the information in the operating instructions of the fast charger and also follow the information given by the vehicle manufacturer.

8.6 Never disconnect the battery from the vehicle electrical system with the engine running.

8.7 Do not short-circuit ignition coil term. 1 to ground (e.g. for stopping the engine). The ignition coil and possibly the control unit will suffer irreparable damage.



8.8 Never bring the positive pole of the battery into contact with ignition coil term. 1. The control unit will suffer irreparable damage.

8.9 Never connect or disconnect the wiring-harness plug of the control unit with the ignition switched on.

8.10 Remove the control unit at temperatures above 80°C (paint-drying installation).

8.11 Remove the control unit before performing welding work (electric spot welding).

8.12 Remove the relay combination when performing a compression test. This prevents undesired injecting of the injection valves.

8.13 When installing an alarm system, follow the information given in the installation instructions for Motronic vehicles or follow technical bulletin "New Product" VDT-I-335/110 En.

It must be ensured that the alarm relay does not suffer interference from stray fields (e.g. from H.T. ignition cables), causing it to trip incorrectly.



**CAUTION!**High-energy ignition system.Dangerous primary and secondary voltages.

The above sticker has the following meaning:  
The Motronic contains a high-performance ignition system which can be dangerous if live parts or terminals are touched (both on the primary as well as secondary sides).

In this connection we should like to point out that the relevant legal regulations concerning work on electrical installations must be observed when testing or working on the ignition system.

The ignition must always be switched off when working on the ignition coil (switch off ignition/voltage source).  
Such work includes:

- Connection of engine testers (timing light, dwell-tach tester, ignition oscilloscope etc).
- Replacement of parts of the ignition system (spark plug, ignition coil, ignition distributor, ignition cable etc).

If, when testing the ignition system or when performing adjustments on the engine (e.g. carburetor), it is necessary to switch on the ignition (switch on ignition/voltage source), the above-mentioned dangerous voltages occur over the entire system.

There is, therefore, danger of accident not only on the individual components of the ignition system (e.g. ignition distributor, ignition coil, trigger box, ignition harness), but also on the wiring harness (e.g. tachometer connection, diagnostic plug), on plug-in connections and on testers.



## 9. TROUBLE-SHOOTING

The following trouble-shooting programs are designed to enable the workshop employees using the Universal test adapter and other suitable testers to quickly detect causes of trouble on the Motronic.

Depending on the level of training and experience of the mechanic a choice can be made between the following procedures:

- Detailed, step-by-step trouble-shooting program for employees with little practice or experience on Motronic vehicles.
- Pin-pointed, direct trouble-shooting chart for trained, experienced employees with a great deal of practice on Motronic vehicles.

**B3****B5**

Both trouble-shooting charts start by checking the electrical/electronic part of the Motronic using the Motronic test adapter EIT 018.01. This makes it possible within a short space of time to check the electrical operation of the wiring harness with the connected components (including control unit) and to quickly locate faults.

If no fault is found using the Motronic test adapter, continue with the detailed or the direct trouble-shooting chart program.

**B1**

Trouble-shooting

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**B2**

Trouble-shooting

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## 9.1 Detailed, step-by-step trouble-shooting

- Test with Motronic test adapter

This test must come at the start of the test program and must be performed from beginning to end (Coordinates B 11...F 9).

- Trouble-shooting according to customer complaints (fault symptoms)

The table below contains possible fault symptoms and the right-hand column gives the first coordinate of the respective detailed trouble-shooting program.

The trouble-shooting program consists of logically ordered test steps for all individual components of the Motronic. If, after completing the trouble-shooting program for an assumed symptom, the fault has not been located or remedied, choose a new fault symptom and work through the respective program.

<u>Customer complaints (fault symptom)</u>	<u>Test with test adapter</u>	<u>Coordinates</u>
1. Engine fails to start or starts only with great difficulty	B 11	F 10
2. Engine starts but then dies	B 11	G 1
3. Uneven engine idle	B 11	G 9
4. Poor throttle take-up	B 11	H 1
5. Engine missing under all operating conditions	B 11	H 11
6. Fuel consumption too high	B 11	J 1
7. No maximum engine power	B 11	J 7
8. CO concentration at idle too high or too low	B 11	K 1





## 9.2 Pin-pointed, direct trouble-shooting

### ● Test with Motronic test adapter

The test with the test adapter must come at the start of the test program and must be performed from beginning to end. (Coordinates B 11...F 9).

### ● Trouble-shooting according to customer complaints

The table below contains various fault symptoms with several possible causes of the fault in each case. The references given on the left indicate the first coordinate of the test step for the respective individual component of the Motronic. If, after testing the individual components, the fault has not been located or remedied, it is necessary to choose a new fault symptom.

#### Customer complaint (fault symptoms)

1. Engine fails to start or starts only with great difficulty

2. Engine starts but then dies

3. Uneven engine idle, idle speed incorrect.

4. Poor throttle take-up

5. Engine missing under all operating conditions

6. Fuel consumption too high

7. No maximum engine power

8. CO concentration at idle too high or too low

Cause (component fault)

B11	B11	B11	B11	B11	B11	B11	B11	Test with Motronic test adapter
●*)								Relay 1 or 2 (main relay or pump relay) defective
●*)								Electric fuel pump not operating
F18	G5		H7					Auxiliary-air device not opening
		G15						Auxiliary-air device not closing
F20	G7	G11	H5	H17	J5	J13	K3	Air-flow sensor defective

**B5**

Trouble-shooting

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**B6**

Trouble-shooting

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# Customer complaints (fault symptoms)

1. Engine fails to start or starts only with great difficulty

2. Engine starts but then dies

3. Uneven engine idle, idle speed incorrect

4. Poor throttle take-up

5. Engine missing under all operating conditions

6. Fuel consumption too high

7. No maximum engine power

8. CO concentration at idle too high or too low

Cause (component fault)

F20	C3	C13	H5				K5	Air-intake system leaking
F14		G17						Solenoid-operated injection valves defective
●*)		●*)				J11		Fuel pressure too low or zero; pressure regulator not operating
		●*)			●*)		●*)	Fuel pressure too high; pressure regulator not operating
				H15				Fuel delivery too low
	●*)				●*)		●*)	Temperature sensor I (air) or temperature sensor II (coolant) defective
						J9		Throttle valve not opening fully
				H13				Poor central ground, loose contacts, faulty plug-in connections
F20	G3	G13	H5			J17	K5	Open circuit in wiring harness and plug-in connections
		●*)				●*)		Throttle-valve switch defective
		G21					K7	CO exhaust-gas setting too rich, idle adjustment
		G21	●*)				K7	CO exhaust-gas setting too lean, idle adjustment
						●*)		Relay for camshaft energization defective
						J17		Solenoid-operated valve for camshaft energization defective

B7

Trouble-shooting

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B8

Trouble-shooting

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# Customer complaints (fault symptoms)

1. Engine fails to start or starts only with great difficulty

2. Engine starts but then dies

3. Uneven engine idle, idle speed incorrect

4. Poor throttle take-up

5. Engine missing under all operating conditions

6. Fuel consumption too high

7. No maximum engine power

8. CO concentration at idle too high or too low

Cause (component fault)

●*)								Engine-speed sensor defective
●*)								Reference-mark sensor defective
				H19				Alternator, check interference-suppression devices
F12		G11	H 3	H13	J 3	J 9	K 3	Check secondary-circuit oscilloscope display
●*)	●*)	●*)	●*)	H15	●*)	●*)	●*)	Control unit defective

●\*) If you have performed the test with Motronic test adapter, this component has already been tested. Continue testing with the next component in this column.  
However, if you have arrived at this point through a component complaint or through the test-specifications table, you must test this component with the Universal test adapter. The test program for the test adapter begins on Coordinate B11 and must be performed from beginning to end.

**B9**

Trouble-shooting

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**B10**

Trouble-shooting

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## 10. TEST WITH UNIVERSAL TEST ADAPTER ETT 018.01

(0 684 101 801) and adapter cable for Motronic

Connect the Motronic test adapter to the Motronic wiring harness (ignition must be off).

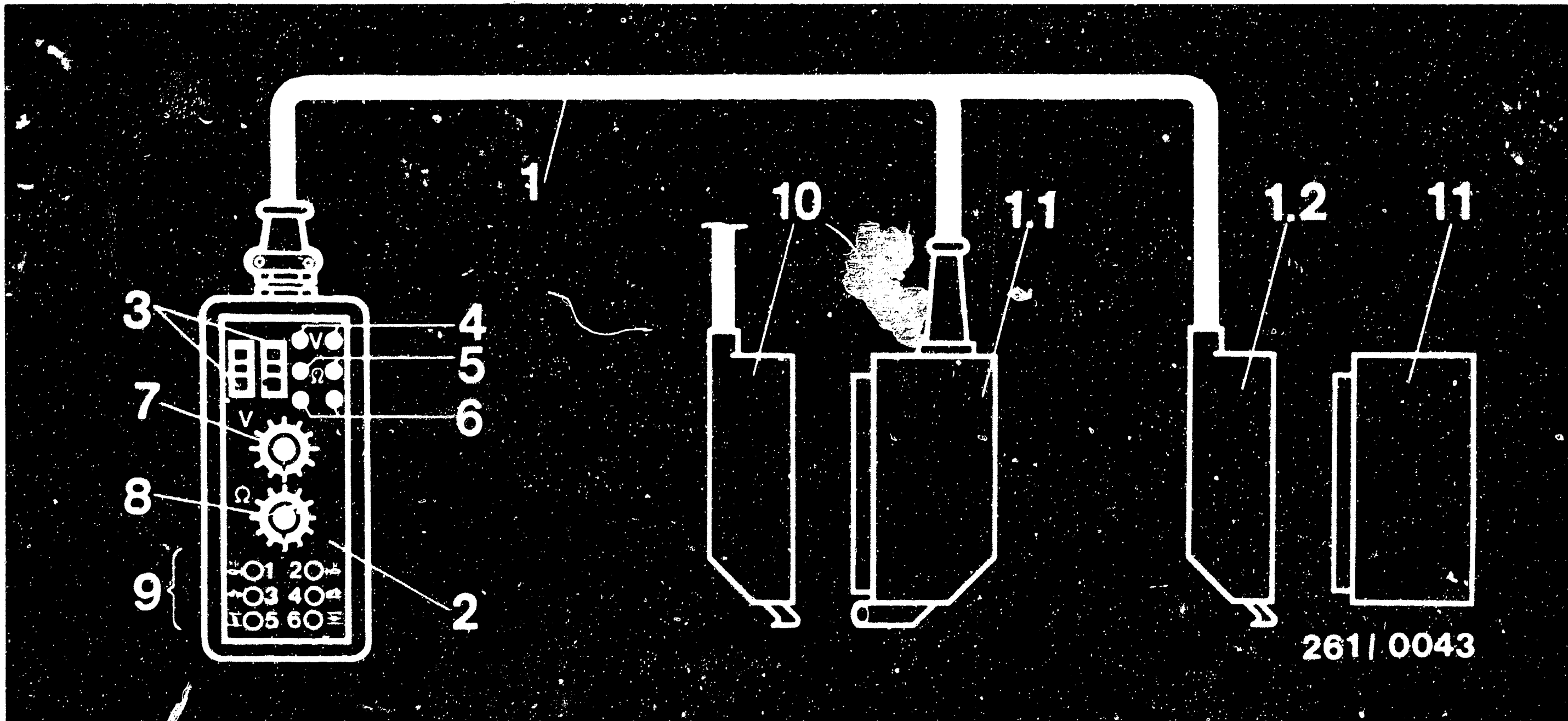
For testing the wiring harness and the connected components, only the Motronic wiring harness must be connected - but not the control unit. Be sure to observe the instructions in the test chart!

A pointer instrument for the voltage and resistance measurements (multimeter) as well as the motortester must be connected to the test adapter in order to make the measurements.

The individual test steps are selected with the program selector switch. The symbols V and  $\Omega$  show the operator whether voltage or resistance is being measured. Some switch positions are necessary for simulation of operating conditions with engine running. By pressing the pushbuttons it is possible, with the control unit connected and the engine running, to simulate given operating conditions. Thus, for example, with the engine at normal operating temperature it is possible by pressing the push-button T1 to make the control unit "think" that the engine temperature is  $-20^{\circ}\text{C}$ . It is then possible to evaluate the reaction of the control unit on the motor-tester.

If necessary, the circuit diagram can be used for trouble-shooting.





261/0043

# Universal test adapter with adapter lead for Motronic

- 1 = Adapter lead
- 1.1 = Connection to wiring harness
- 1.2 = Connection to control unit
- 2 = Universal adapter (Part No.: 0 684 001 801)
- 3 = Test wells (for motortester)
- 4 = Test sockets (for voltage measurement)
- 5 = Test sockets (for resistance measurement)
- 6 = Test sockets (not occupied)
- 7 = Program switch "V"
- 8 = Program switch "Ω"

- 9 = Button panel for simulation of operating conditions
- 10 = Motronic wiring harness
- 11 = Control unit
- Button 1 = NTC II (engine), cold (-20° C)
- Button 2 = NTC II (engine), warm (+80° C)
- Button 3 = Pump energization
- Button 4 = Not occupied
- Button 5 = Throttle-valve idle contact
- Button 6 = Throttle-valve full-load contact

**B12**

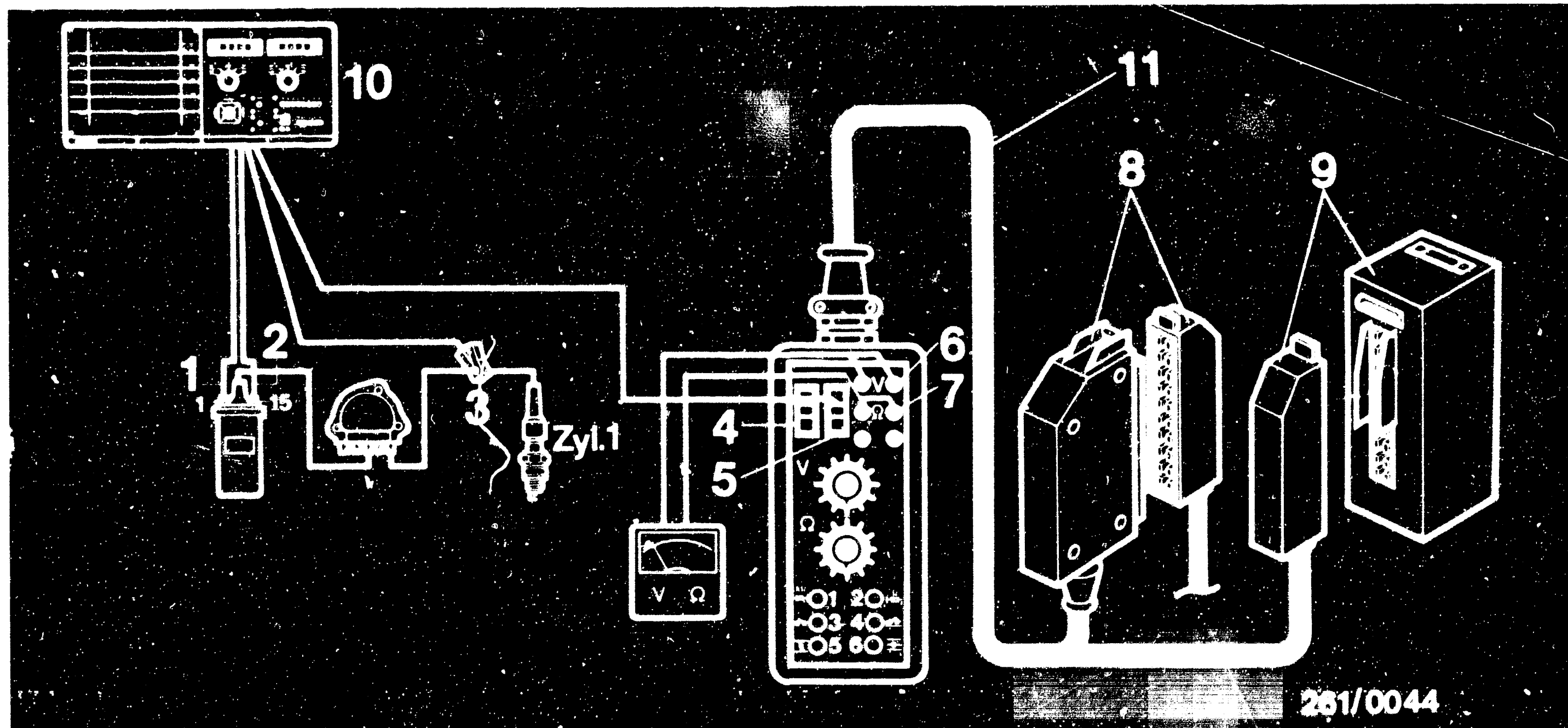
Test with universal test adapter  
Alfa Romeo Quadrifoglio



**B13**

Test with universal test adapter  
Alfa Romeo Quadrifoglio





261/0044

### Connection diagram for test adapter

- |  |  |
|--|--|
| 1 = Green clip to ignition coil term. 1                                    | 6 = Connection of voltmeter to V sockets (red = +, black = ground or negative) |
| 2 = Yellow clip to ignition coil term. 15                                  | 7 = Connection of ohmmeter to black $\Omega$ sockets (blue)                    |
| 3 = Induction-type clamp-on pickup over H.T. ignition cable of cylinder 1  | 8 = Connection to Motronic wiring harness                                      |
| 4 = Red connection socket (test well) for red terminal of motortester      | 9 = Connection to Motronic control unit  |
| 5 = Black connection socket (test well) for black terminal of motor tester | 10 = Motortester   |
|  | 11 = Adapter cable for Motronic  |

**B14**

Test with universal test adapter

Alfa Romeo Quadrifoglio



**B15**

Test with universal test adapter

Alfa Romeo Quadrifoglio



## Preparations for test with Universal test adapter

Remove the control unit and connect the test adapter.

Installation position of the control unit: in glove compartment on right.  
the steering column.

To remove the control unit, force back the detent and hinge up and remove the plug in the direction of the arrow.

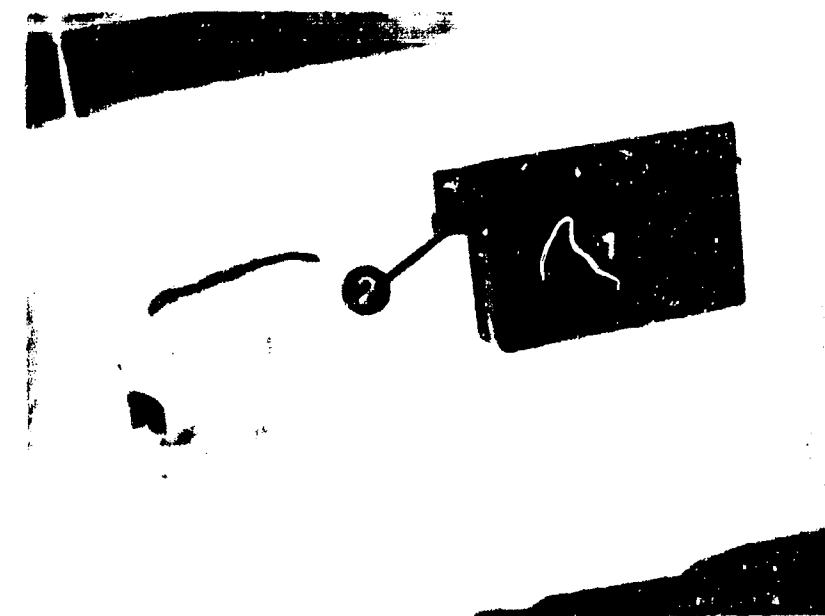
The control unit is secured by 4 screws.

### Note

In order to rule out any confusion between the control units of the various systems, a mechanical locking device has been introduced. The "locating lug" (pivot point when opening and connecting the control unit) and the corresponding mounting point on the control unit have matching recesses and pins.

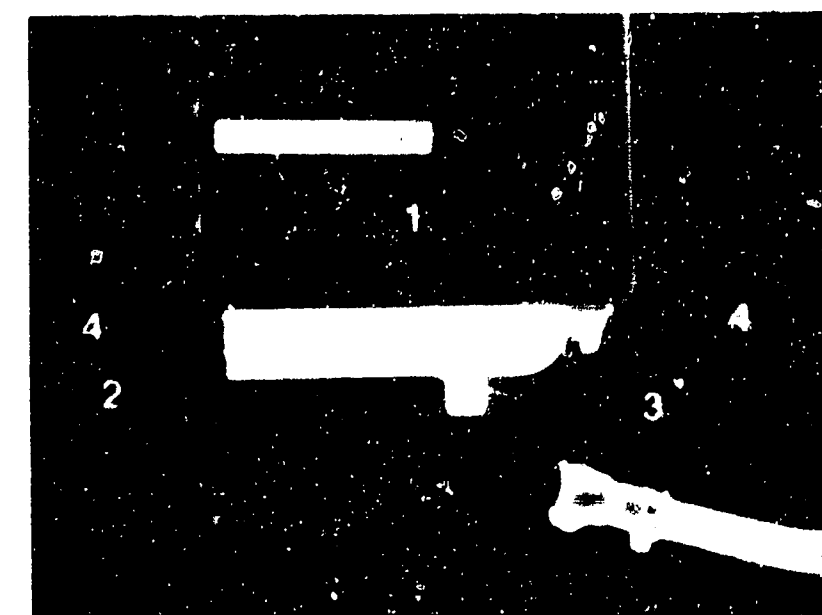
### Note:

In the following test steps, the column "operation" has a white border to show which operation has to be changed compared with the previous operation.



- 1 = Control unit
- 2 = Fastening screws

- 1 = Control unit
- 2 = Locating lug
- 3 = Detent
- 4 = Fastening holes



**B 16**

Test with universal test adapter

Alfa Romeo Quadrifoglio




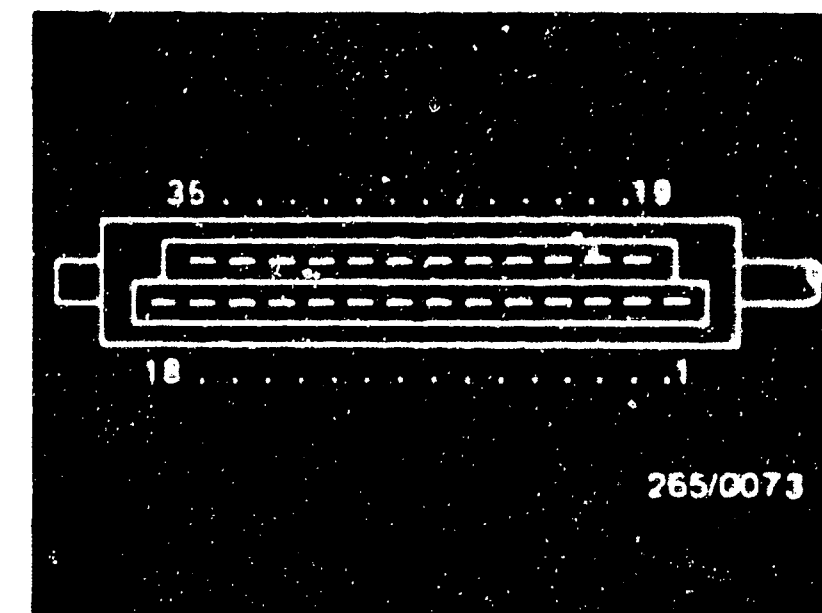
**B 17**

Test with universal test adapter

Alfa Romeo Quadrifoglio



Test step 1: Switch off ignition. Disconnect control unit.		
Operation	Reading	Testing
Program switch "V" at position:	<div>  </div> <div> 1 </div>	<div> Component: Engine-speed sensor </div>
Program switch " " at position:		
Measuring equipment: Multimeter ( range)		<div> Operation: Insulation between Term. 8 and ground </div>
Measuring range: 10 M ..		<div> Malfunction: Resistance less than 1 M <math>\Omega</math> </div>
Connection: Test sockets		
Operation in vehicle: Switch off ignition		



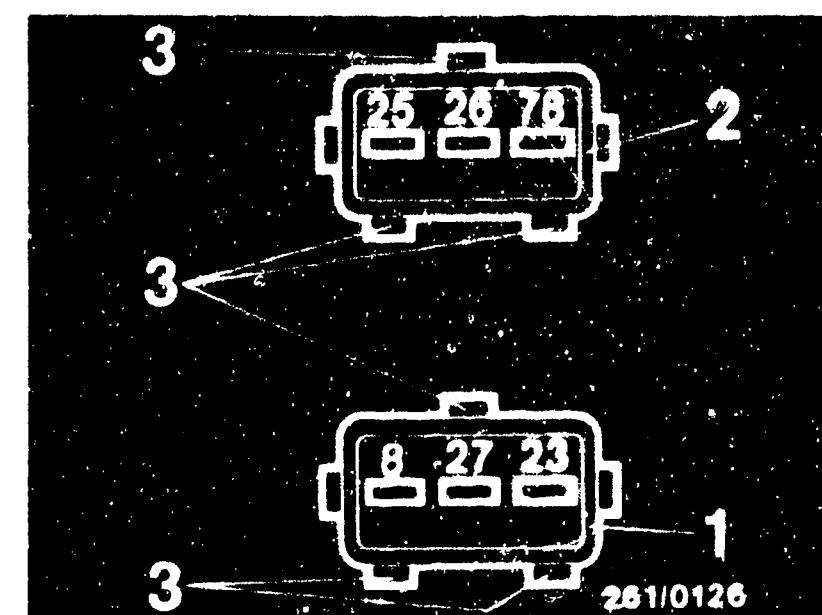
Top view of 35-pin multiple plug

- 1 = Connector for engine-speed sensor
- 2 = Connector for reference-mark sensor (marked)
- 3 = Locating lugs

#### Trouble-shooting:

Resistance reading approx. 0  $\Omega$ :  
Check lead 8 for short circuit to ground.

Resistance reading 0.6 ... 1.6 k $\Omega$ :  
Check lead 27 for short circuit to ground.



**B18**

Test with universal test adapter  
Alfa Romeo Quadrifoglio



**B19**

Test with universal test adapter  
Alfa Romeo Quadrifoglio



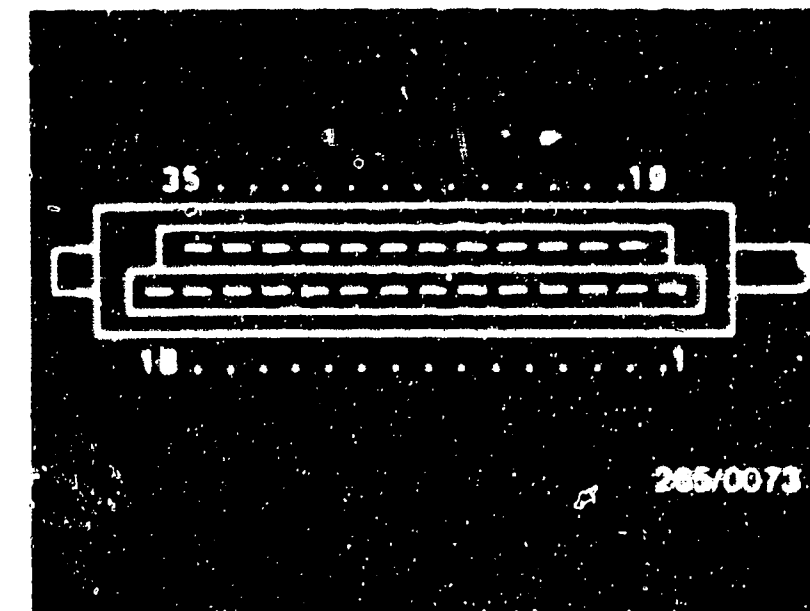


Test step 2			
Operation		Reading	Testing
Program switch "V" at position:	↓	Multimeter must indicate <u>greater than 1 M <math>\Omega</math></u>	<u>Component:</u>  Reference-mark sensor
Program switch "2" at position:	2		
<u>Measuring equipment:</u> Multimeter ( $\Omega$ range)		If reading OK, continue testing with <u>next test step.</u>	<u>Operation:</u>  Insulation between Term. 25 and ground
<u>Measuring range:</u> 10 M $\Omega$			
<u>Connection:</u> Test sockets $\Omega$			
<u>Operation in vehicle:</u> Switch off ignition.			
			<u>Malfunction:</u>  Resistance less than 1 M $\Omega$

#### Trouble-shooting:

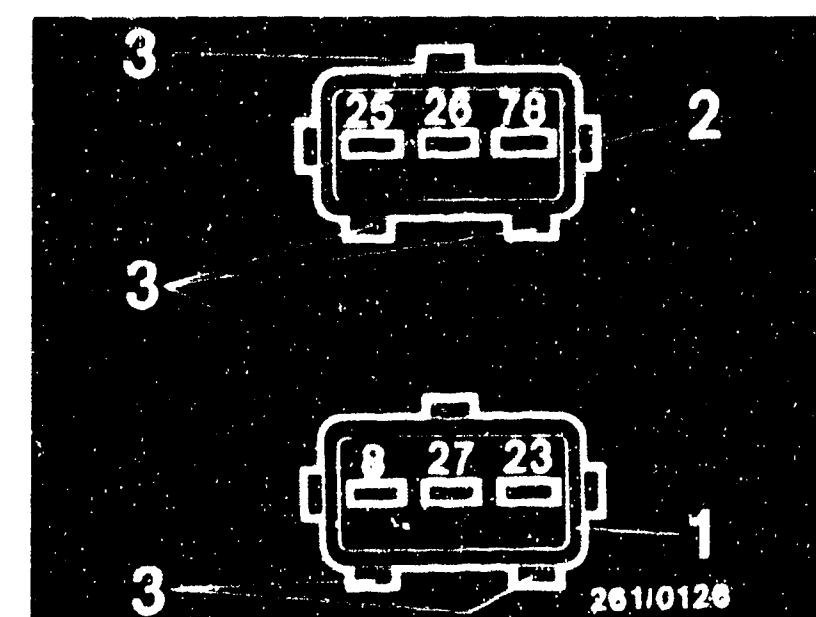
Resistance reading approx. 0  $\Omega$ :  
Check lead 25 for short circuit to ground.

Resistance reading 0.6...1.6 k $\Omega$ :  
Check lead 25 for short circuit to ground.



Top view of 35-pin multiple plug

- 1 = Connector for engine-speed sensor
- 2 = Connector for reference-mark sensor (marked)
- 3 = Locating lugs



**B 20**


Test with universal test adapter  
Alfa Romeo Quadrifoglio



**B 21**

Test with universal test adapter  
Alfa Romeo Quadrifoglio



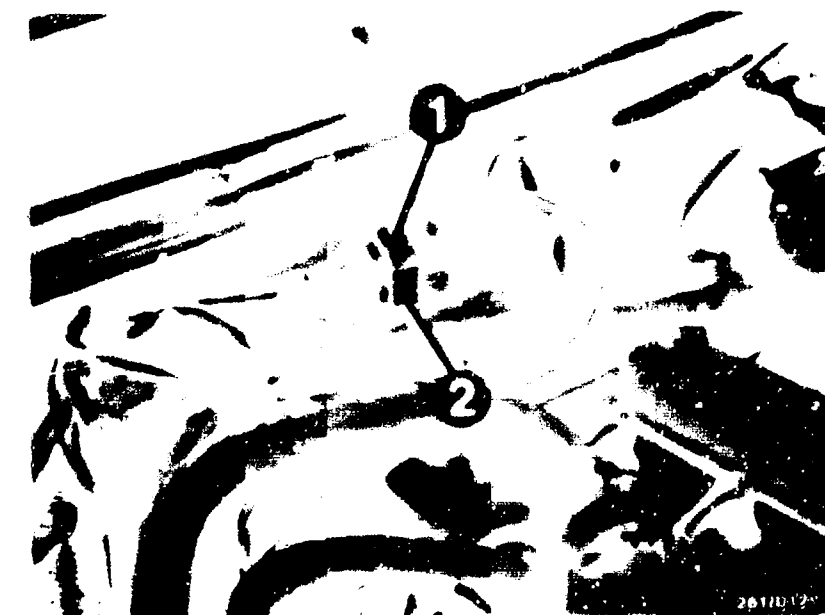
Test step 3		
Operation	Reading	Testing
Program switch "V" at position:	<div>  </div> Multimeter must indicate 0.6...1.6 kΩ	Component:  Engine-speed sensor
Program switch "Ω" at position:		Operation:  Winding resistance between Term. 8 and Term. 27
Measuring equipment: Multimeter (Ω range)		Malfunction:  Resistance outside tolerance
Measuring range: 0 to 10 kΩ		
Connection: Test sockets		
Operation in vehicle: Switch off ignition	If reading OK, continue testing with next test step.	

#### Trouble-shooting:

- Repeat measurement directly at sensor plug.
- Check plug-in connection: Corrosion, loose contact (spring contacts must not allow themselves to be pushed back)
- Check leads from engine-speed sensor Term. 8 and Term. 27 to multiple plug Term. 8 and Term. 27.
- Replace sensor.

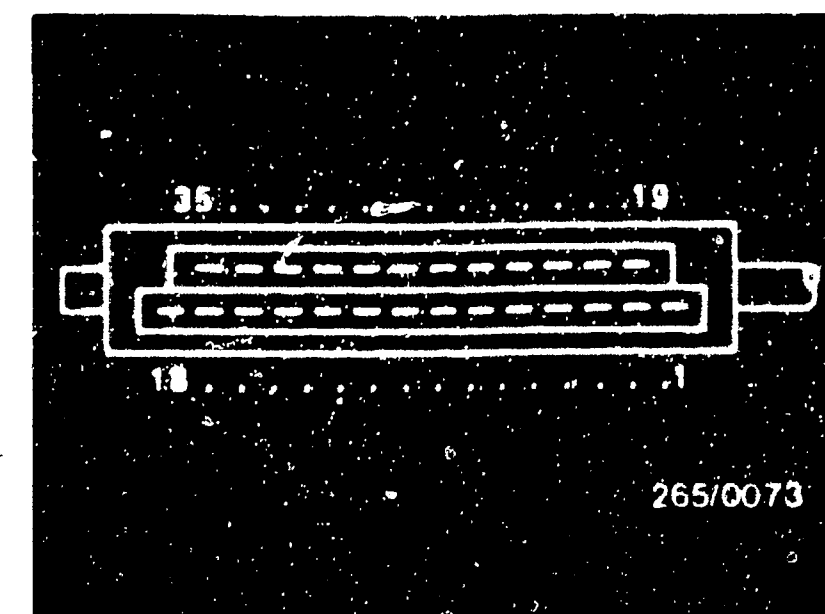
To replace the sensors, undo the plug-in connection and unscrew the hexagon-socket-head cap screw on the sensor. Remove dirt deposits on the sensor. If necessary, apply two screwdrivers to the recesses to left and right of the sensor and raise the sensor. Caution! Do not loosen the mounting.

Continued on C1/C2



1 = Engine-speed sensor  
2 = Reference-mark sensor

Top view of 35-pin multiple plug of Motronic wiring harness



**B22**

Test with universal test adapter  
Alfa Romeo Quadrifoglio

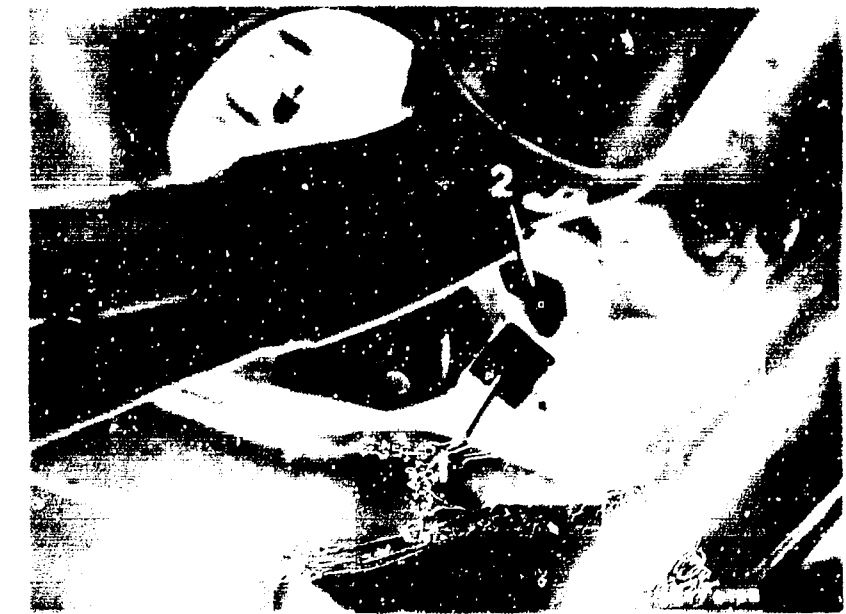
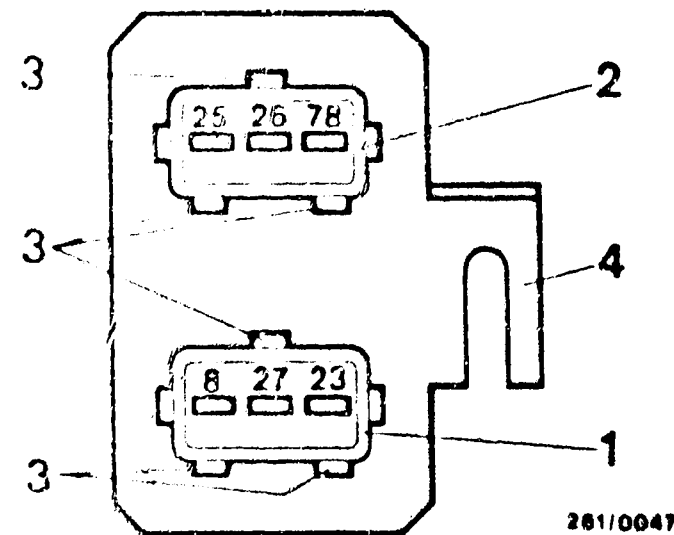


**B23**

Test with universal test adapter  
Alfa Romeo Quadrifoglio



# Trouble-shooting - Test step 3 (continued)



1 = Reference-mark sensor  
2 = Engine-speed sensor

## Top view of sensor connectors

- 1 = Connector from engine-speed sensor (black plug)
- 2 = Connector from reference-mark sensor (gray plug)
- 3 = "Lugs" as locking element

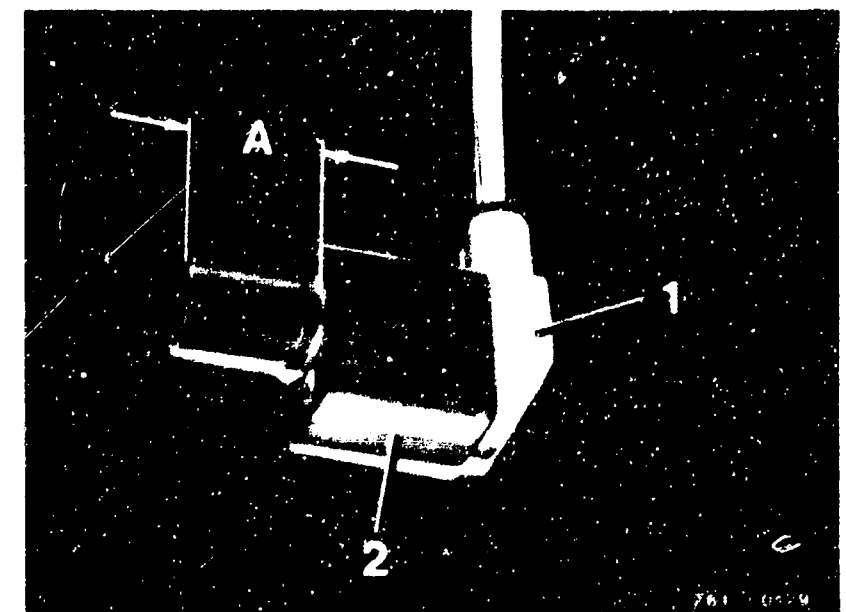
78, 25, 26, 23, 8, 27 = Terminal numbers

Before installing the sensor, make sure that no metallic parts are sticking to the sensor (sensors contain permanent magnets). Grease sensors with Molykote Longterm 2.

Do not mix up the sensors when installing!

The sensors are plugged into the mounting block and then into the correct bore in the starting-motor ring-gear housing. Do not use force when inserting. Screw down sensor. When mounting, make sure that the connectors are not mixed up. Make sure connector is properly seated and that spring contacts latch into plug. Spring contacts must not allow themselves to be pushed back.

1 = Sensor  
2 = Mounting block



C1

Test with universal test adapter  
Alfa Romeo Quadrifoglio



C2

Test with universal test adapter  
Alfa Romeo Quadrifoglio



Test step 4			
Operation		Reading	Testing
Program switch "V" at position:	↓	Multimeter must indicate:  <u>0.6...1.6 kΩ</u>	<u>Component:</u>  Reference-mark sensor
Program switch "2" at position:	4		<u>Operation:</u>  Winding resistance between Term. 25 and Term. 26
Measuring equipment: Multimeter (Ω range)			<u>Malfunction:</u>  Resistance outside tolerance.
Measuring range: 0 to 10 kΩ			
Connection: Test sockets	Ω		
Operation in vehicle: Switch off ignition			

#### Trouble-shooting:

- Repeat measurement directly at sensor plug.
- Check plug-in connection for corrosion, loose contact (spring contacts must not allow themselves to be pushed back)
- Check leads from reference-mark sensor Term. 25 and Term. 26 to multiple plug Term. 25 and Term. 26.
- Replace sensor.

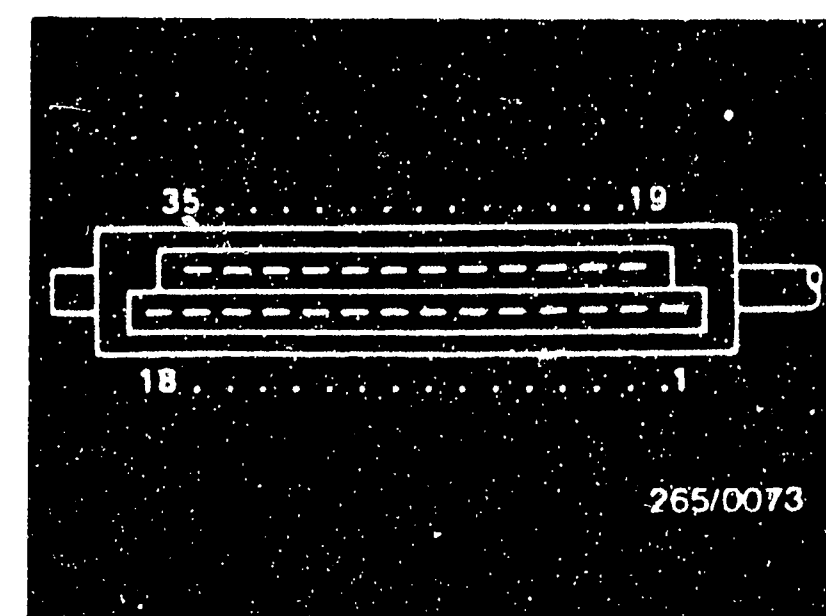
To replace the sensors, undo plug-in connection and unscrew hexagon-socket-head cap screw on sensor. Remove dirt deposits from sensor. If necessary, apply two screwdrivers to the recesses on left and right on the sensor and lift sensor.

Continued on C5/C6



- 1 = Engine-speed sensor  
2 = Reference-mark sensor

Top view of 35-pin multiple plug of Motronic wiring harness



265/0073

**C3**

Test with universal test adapter  
Alfa Romeo Quadrifoglio

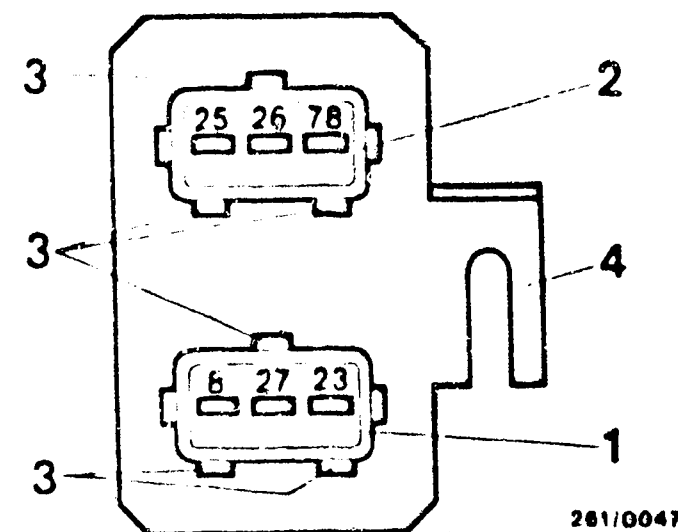


**C4**

Test with universal test adapter  
Alfa Romeo Quadrifoglio



# Trouble-shooting - Test step 4 (continued)



Top view of sensor connectors

- 1 = Connector from engine-speed sensor (black plug)
- 2 = Connector from reference-mark sensor (gray plug)
- 3 = "Lugs" as locking element

78, 25, 26, 23, 8, 27 = Terminal numbers

Before installing the sensor, make sure that no metallic parts are sticking to the sensor (sensors contain permanent magnets). Grease sensors with Molykote Longterm 2.

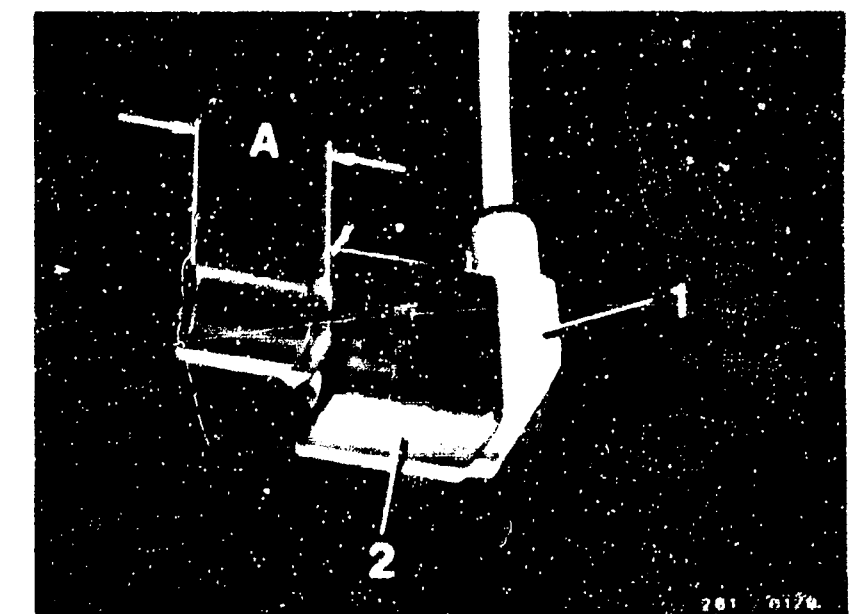
Do not mix up the sensors when installing!

The sensors are plugged into the mounting block and then into the correct bore in the starting-motor ring-gear housing. Do not use force when inserting. Screw down sensor. When mounting, make sure that the connectors are not mixed up. Make sure connector is properly seated and that spring contacts latch into plug. Spring contacts must not allow themselves to be pushed back.



- 1 = Reference-mark sensor
- 2 = Engine-speed sensor

- 1 = Sensor
- 2 = Mounting block



**C5**

Test with universal test adapter  
Alfa Romeo Quadrifoglio



**C6**

Test with universal test adapter  
Alfa Romeo Quadrifoglio



Test step 5		
Operation		Reading
Program switch "V" at position:	↓	<p>Reading is temperature -dependent, i.e. note engine temperature. At ambient temperature (+15°...+30°C): 1.45...3.3 kΩ</p> <p>With engine at normal operating temperature (approx. + 80° C): 280...360Ω</p> <p>If reading OK, continue testing with next test step.</p>
Program switch "Ω" at position:	5	
Measuring equipment: Multimeter (Ω range)		
Measuring range: 0 to 10 kΩ		
Connection: Test sockets	Ω	
Operation in vehicle: Switch off ignition		
		Testing
		<p><u>Component:</u></p> <p>Engine temperature sensor (NTC II)</p>
		<p><u>Operation:</u></p> <p>Resistance between Term. 13 and ground</p>
		<p><u>Malfunction:</u></p> <p>Resistance outside tolerance. Note temperature.</p>

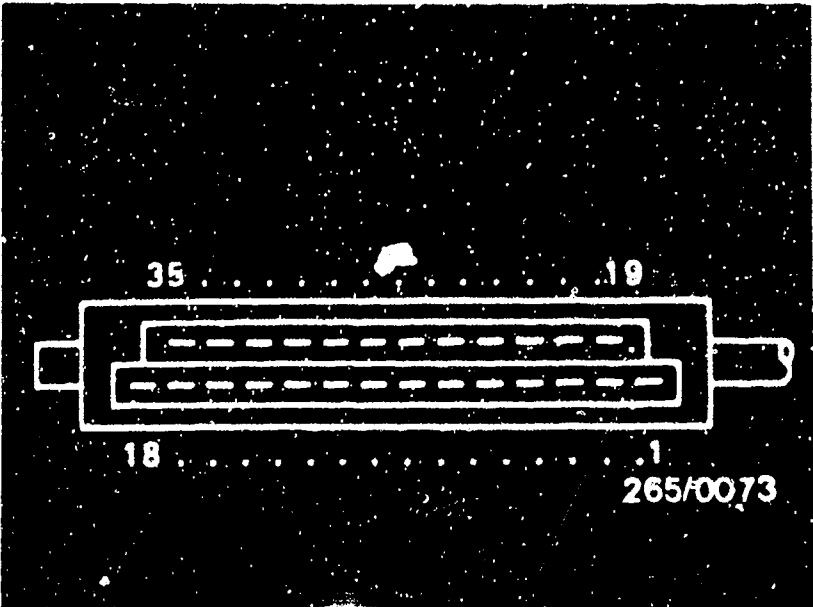


Arrow = Temperature sensor (NTC II)

Top view of 35-pin multiple plug of Motronic wiring harness

Trouble-shooting:

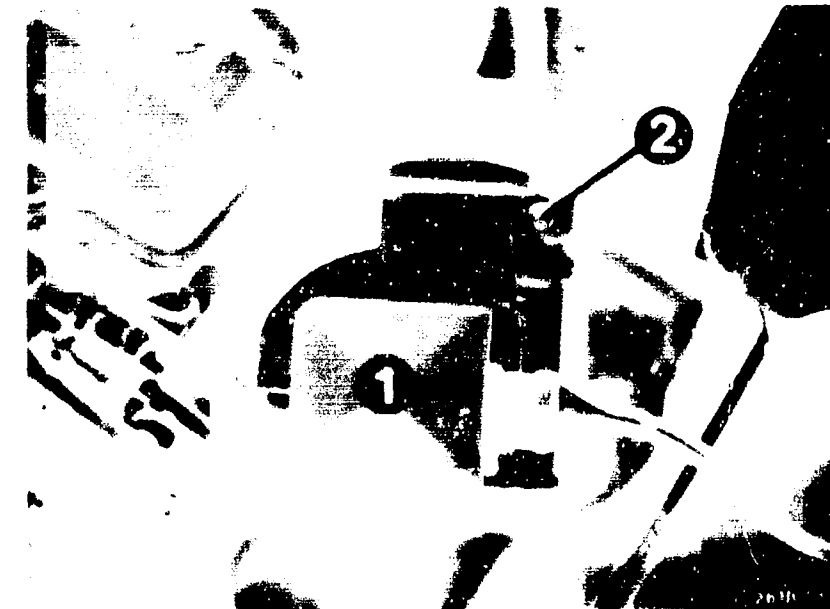
- Remove plug from temperature sensor and measure resistance directly. If necessary, replace temperature sensor.
- Check leads from temperature sensor to multiple plug Term. 13 and to ground terminal.
- Eliminate contact resistances at the plug-in connections. Spring contacts must not allow themselves to be pushed back.



Test step 6		Reading	Testing
Operation			
Program switch "V" at position:	↓	Reading is temperature-dependent, i.e. note engine temperature. At ambient temperature (+15°...+30° C): 1.45...3.3 kΩ  With engine at normal operating temperature (approx. + 80° C): 280...360Ω  If reading OK, continue testing with next test step.	Component: Air temperature sensor (NTC 1)
Program switch "Ω" at position:	6		
Measuring equipment: Multimeter (Ω range)			Operation: Resistance between Term. 22 and ground
Measuring range: 0 to 10 kΩ			
Connection: Test sockets	Ω		Malfunction: Resistance outside tolerance. Note temperature.
Operation in vehicle: Switch off ignition			

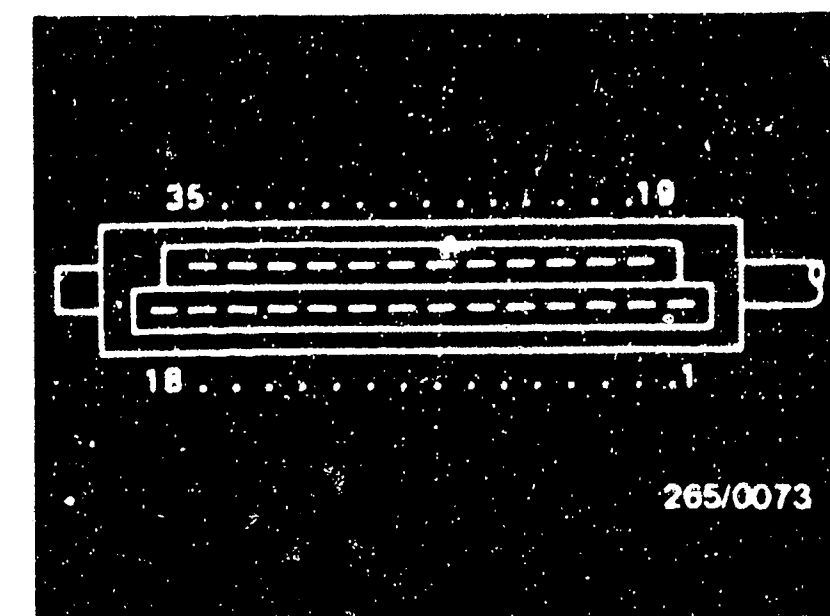
#### Trouble-shooting:

- Remove plug from air-flow sensor and measure resistance directly at Term. 22 and Term. 6. If reading outside tolerance, replace air-flow sensor.
- Check leads from air-flow sensor Term. 6 and Term. 22 to multiple plug Term. 6 and Term. 22
- Eliminate contact resistances in the plug-in connections.  
Spring contacts must not allow themselves to be pushed back.



1 = Air-flow sensor with NTC 1  
2 = Idle-mixture-adjusting screw

Top view of 35-pin multiple plug of Motronic wiring harness



**C9**


Test with universal test adapter  
Alfa Romeo Quadrifoglio

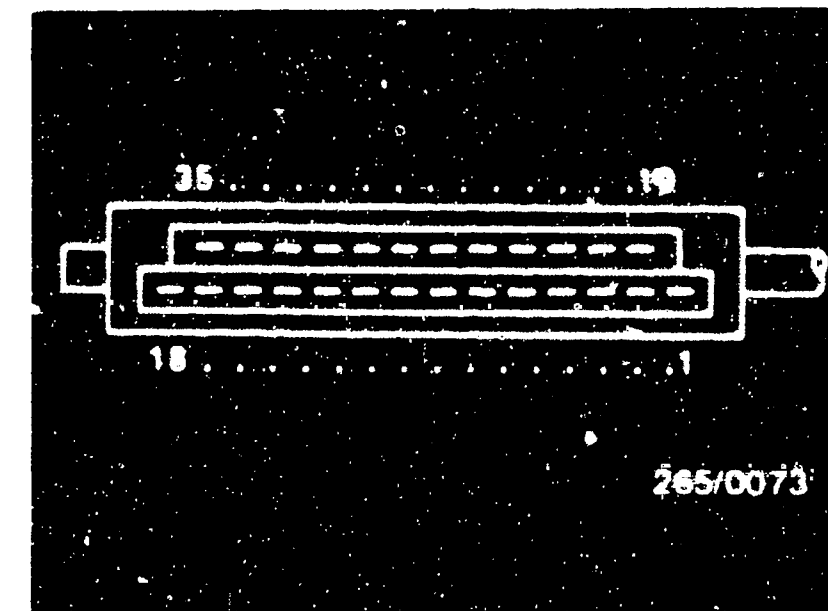


**C10**

Test with universal test adapter  
Alfa Romeo Quadrifoglio



Test step 7		Reading	Testing
Operation			
Program switch "V" at position:		Multimeter must indicate	Component: Lead for map switch-over
Program switch " " at position:	7	On Sweden/Switzerland version:	
Measuring equipment: Multimeter ( range)		Less than 15 $\Omega$	Operation: Connection between term. 10 and ground
Measuring range: 0 to 10 k		If reading O.K., continue testing with next test step.	
Connection: Test sockets			
Operation in vehicle: Switch off ignition			



Top view of 35-pin multiple plug of Motronic wiring harness

#### Trouble-shooting:

- Undo connection between multiple plug term. 10 and ground.
- On Sweden/Switzerland version:
- Establish connection from multiple plug term. 10 to ground.

**C11**

Test with universal test adapter  
Alfa Romeo Quadrifoglio



**C12**

Test with universal test adapter  
Alfa Romeo Quadrifoglio





Test step 8 deleted

Test step 9		Reading	Testing
Operation			
Program switch "V" at position:	↓	Accelerator in rest position: Less than 15Ω	Component: Throttle-valve switch
Program switch "I" at position:	9	(Measured value is influenced by protective resistor in adapter).	Operation:
Measuring equipment: Multimeter (Ω range)		Accelerator depressed (Part-load range): $\infty \Omega$ 1)	Idle contact between terminal 2 and ground
Measuring range: 0 to 10 kΩ			Malfunction:
Connection: Test sockets	Ω	If reading O.K., continue testing with next test step.	Resistance in rest position greater than 15Ω or less than $\infty \Omega$ .
Operation in vehicle: switch off ignition			



- 1 = Auxiliary-air device
- 2 = Throttle-valve switch
- 3 = Idle-speed adjusting screw

#### Trouble-shooting:

##### 1) Adjusting the throttle-valve switch:

Loosen the fastening screws. Turn the operating lever to full throttle and slowly return to the idle stop.  
Turn the switch in a clockwise direction until the inner stop can be felt. Tighten screws.

Continued on C15/C16

**C13**

Test with universal test adapter  
Alfa Romeo Quadrifoglio



**C14**

Test with universal test adapter  
Alfa Romeo Quadrifoglio



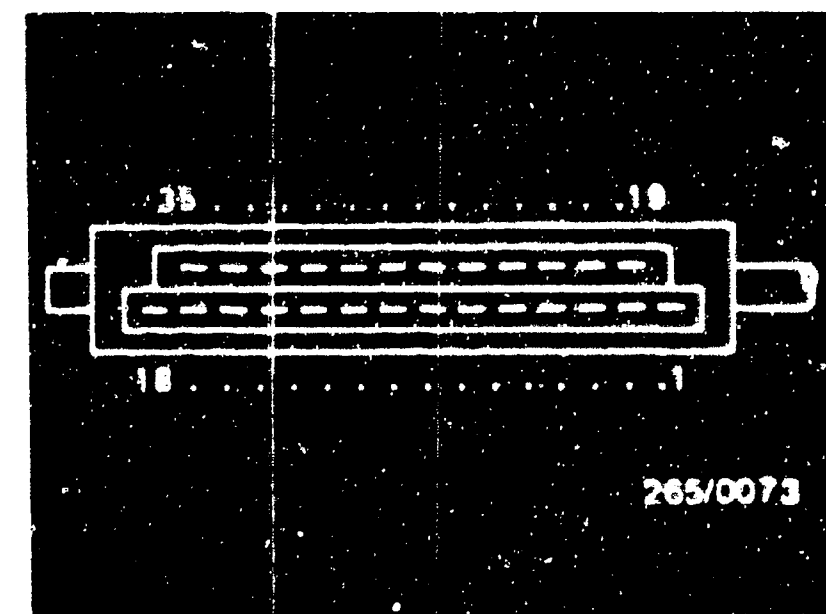
Trouble-shooting - Test step 5 (continued)

Check: Slowly open throttle in full-load direction. Reading must change to  $\infty \Omega$  shortly after the throttle is opened.

If no adjustment is possible:

Check Bosch throttle-valve switch as well as leads from throttle-valve switch Term. 2 and Term. 43 to multiple plug Term. 2 and to ground terminal. Eliminate contact resistances.

Spring contacts must not allow themselves to be pushed back.



Top view of 35-pin  
multiple plug of Motronic  
wiring harness

**C15**

Test with universal test adapter

Alfa Romeo Quadrifoglio



**C16**

Test with universal test adapter

Alfa Romeo Quadrifoglio



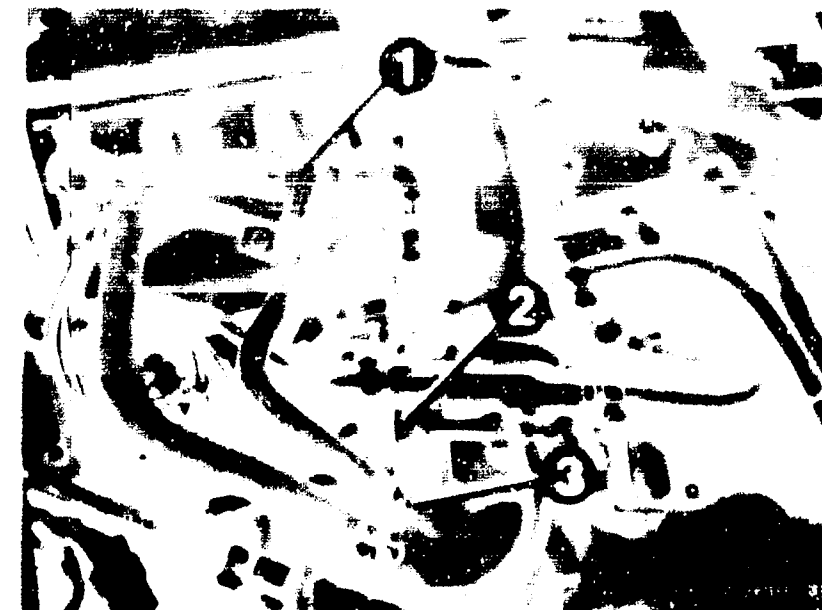
Test step 10			
Operation		Reading	Testing
Program switch "V" at position:	↓	Accelerator in part- load position:  $\infty \Omega$	Component:  Throttle-valve switch
Program switch "Q" at position:	10	Accelerator at full- load stop:  Less than $15\Omega^{1)}$	Operation:  Full-load contact between terminal 3 and ground
Measuring equipment: Multimeter ( $\Omega$ range)		(Measured value is influenced by protec- tive resistor in adapter)	Malfunction:  Resistance at full load greater than $15\Omega$ or $\infty\Omega$ .
Measuring range:  0 to 10 k $\Omega$			
Connection: Test sockets	$\Omega$	If reading O.K., continue testing with next <u>test step</u> .	
Operation in vehicle: Switch off ignition			

#### Trouble-shooting:

<sup>1)</sup> Check: Move the throttle valve in the full-load direction. Reading changes to less than  $15\Omega$  (full-load contact closed) shortly before the full-load stop of the operating lever.

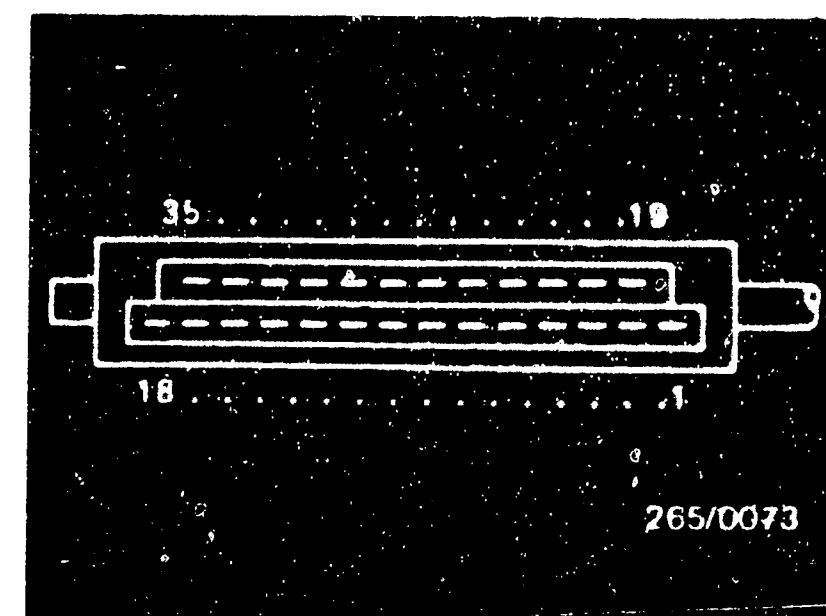
#### Reading greater than $15\Omega$ or $\infty \Omega$ :

Check whether the throttle valve is opening fully. Check the throttle linkage/Bowden cable from the accelerator to the throttle valve.  
Check Bosch throttle-valve switch as well as lead from throttle-valve switch Term. 3 to multiple plug Term. 3.  
Eliminate contact resistances.  
Spring contacts must not allow themselves to be pushed back.



- 1 = Auxiliary-air device
- 2 = Throttle-valve switch
- 3 = Idle-speed adjusting screw

Top view of 35-pin multiple plug of Motronic wiring harness



**C17**

Test with universal test adapter  
Alfa Romeo Quadrifoglio



**C18**

Test with universal test adapter  
Alfa Romeo Quadrifoglio



Test step 11		
Operation	Reading	Testing
Program switch "V" at position:	↓	<u>Component:</u> Ground lead
Program switch "/" at position:	11	
<u>Measuring equipment:</u> Multimeter ( $\Omega$ range)	(Measured value is influenced by protective resistor in adapter)	<u>Operation:</u> Contact resistance between Term. 16 and ground
<u>Measuring range:</u> 0 to 10 k $\Omega$		
<u>Connection:</u> Test sockets	$\Omega$	<u>Malfunction:</u> Resistance greater than 15 $\Omega$
<u>Operation in vehicle:</u> Switch off ignition		

#### Trouble-shooting:

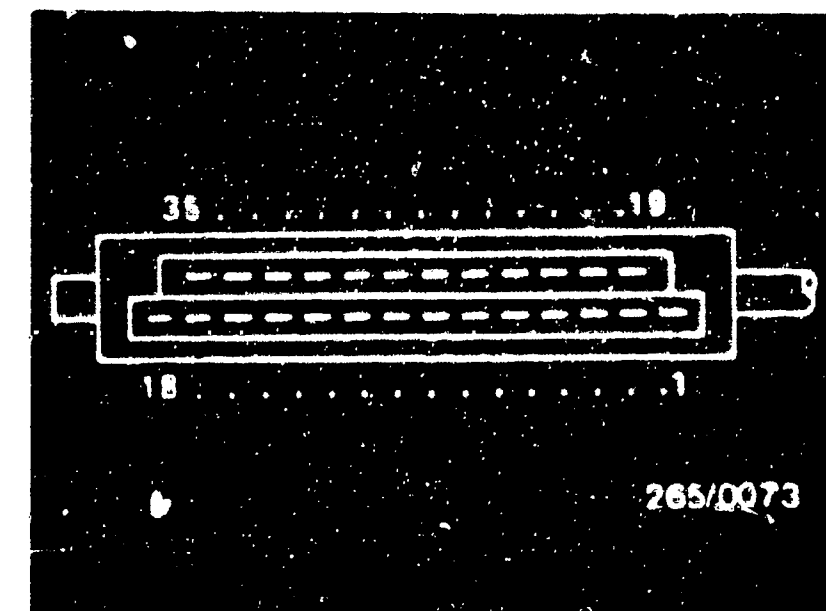
For testing, disconnect wiring-harness plug from test adapter and use circuit diagram if necessary.

Test the following lead for continuity with ohmmeter  
(Set value approx. 0.):

- From multiple plug term. 5 and term. 16 to the ground terminals.

Eliminate contact resistances at the connection points.

Spring contacts must not allow themselves to be pushed back.



Top view of 35-pin multiple plug of Motronic wiring harness

Arrows = Ground leads



**C19**

Test with universal test adapter  
Alfa Romeo Quadrifoglio



**C20**

Test with universal test adapter  
Alfa Romeo Quadrifoglio



Test step 12		
Operation		Reading
Program switch "V" at position:	↓	Multimeter must indicate less than 15 $\Omega$  (Measured value is influenced by protective resistor in adapter)
Program switch "A" at position:	12	
Measuring equipment:		If reading OK, continue testing with next test step.
Multimeter ( range)		
Measuring range:		
0 to 10 k $\Omega$		
Connection:		Resistance greater than 15 $\Omega$
Test sockets	$\Omega$	
Operation in vehicle:		
Switch off ignition		

#### Trouble-shooting:

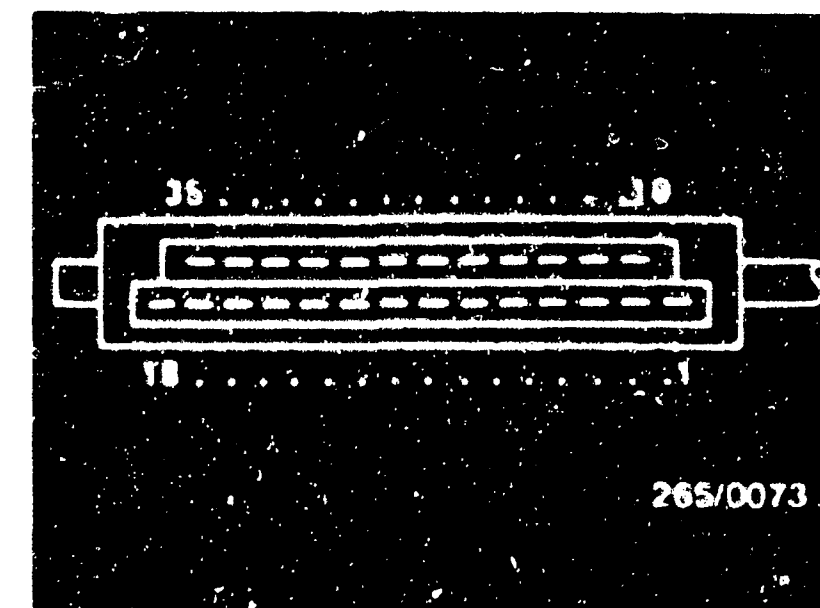
For testing, remove wiring-harness plug from test adapter and, if necessary, use circuit diagram.

Test the following leads for continuity using ohmmeter (set value approx. 0 $\Omega$ ):

- From multiple plug Term. 17 to output stage ground terminal.

Eliminate contact resistances at connection points.

Spring contacts must not allow themselves to be pushed back.



Top view of 35-pin multiple plug of Motronic wiring harness

Arrows = Ground leads



**C21**

Test with universal test adapter  
Alfa Romeo Quadrifoglio



**C22**

Test with universal test adapter  
Alfa Romeo Quadrifoglio



Test step 13			
Operation		Reading	Testing
Program switch "V" at position:		↓  Multimeter must indicate less than 15 Ω  (Measured value is influenced by protective resistor in adapter)  If reading OK, continue testing with next test step.	<u>Component:</u>  Ground lead
Program switch "2" at position:			
Measuring equipment:			<u>Operation:</u>  Contact resistance between Term. 19 and ground
Multimeter (Ω range)			
Measuring range:			
0 to 10 kΩ			
Connection:		Ω	<u>Malfunction:</u>  Resistance greater than 15 Ω
Test sockets			
Operation in vehicle			
Switch off ignition			

### Trouble-shooting

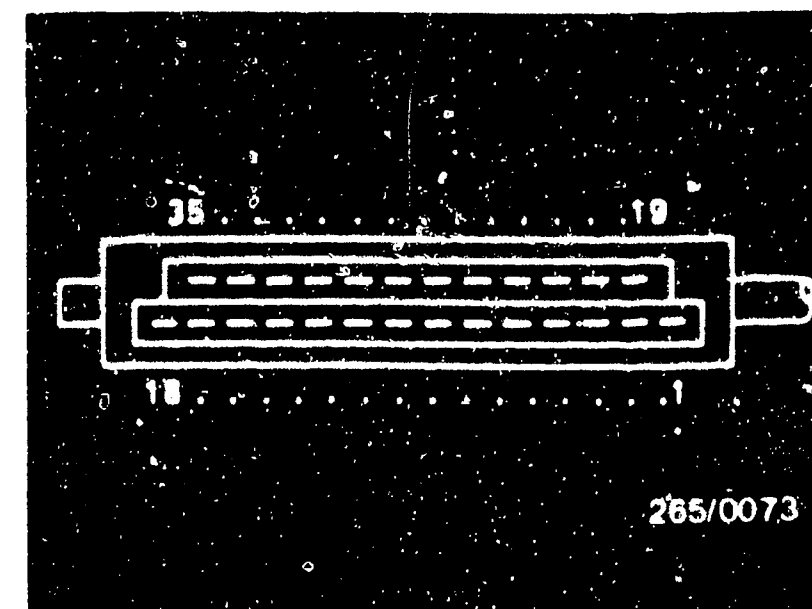
For testing, remove wiring-harness plug from adapter and, if necessary, use circuit diagram.

Test the following leads for continuity using ohmmeter (set value approx. 0  $\Omega$ )

- From multiple plug Term. 19 to output stage ground terminal.

Eliminate contact resistances at connection points.

Spring contacts must not allow themselves to be pushed back.



Top view of 35-pin multiple plug of Motronic wiring harness

Arrows = Ground leads



**C23**

Test with universal test adapter  
Alfa Romeo Quadrifoglio

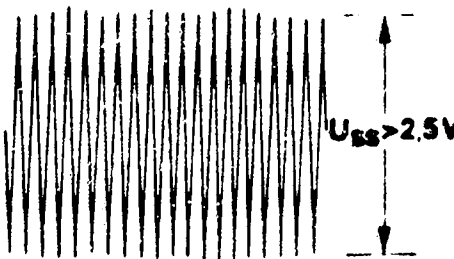


**C24**

Test with universal test adapter  
Alfa Romeo Quadrifoglio



# Test step 16 (Test steps 14 and 15 deleted)

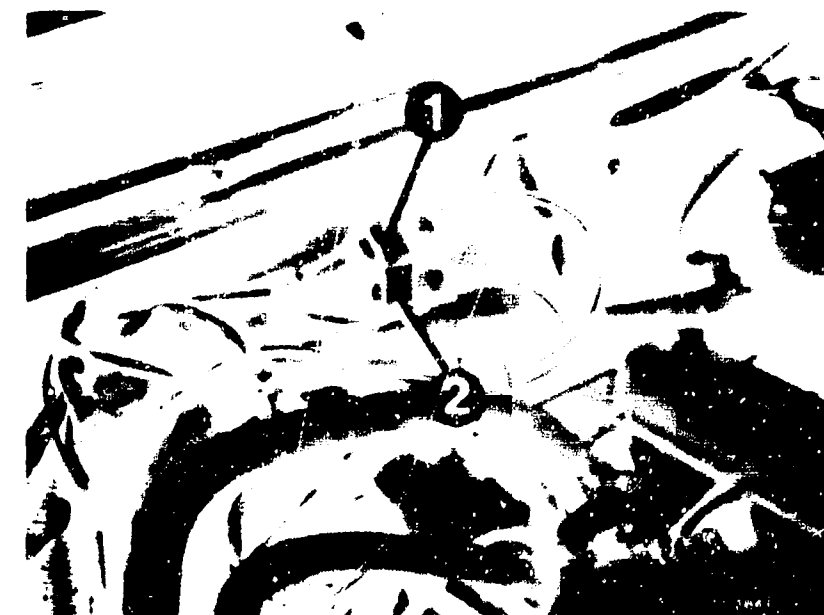
Operation		Reading	Testing
Program switch "V" at position:	1		<u>Component:</u>  Engine-speed sensor
Program switch "C" at position:	15		
<u>Measuring equipment:</u> Motortester, oscilloscope		Lever to left-hand stop (calibrated voltage range)  If reading OK, continue testing with next test step.	<u>Operation:</u>  Amplitude (signal) at terminals 8 and 27
<u>Measuring range:</u> Special input			<u>Malfunction:</u>  No signal or signal too small. Incorrect signal
<u>Connection:</u> Test wells; red clip to red well, black clip to black well			
<u>Operation in vehicle:</u> Shift gear to neutral and operate starting motor			

## Trouble-shooting:

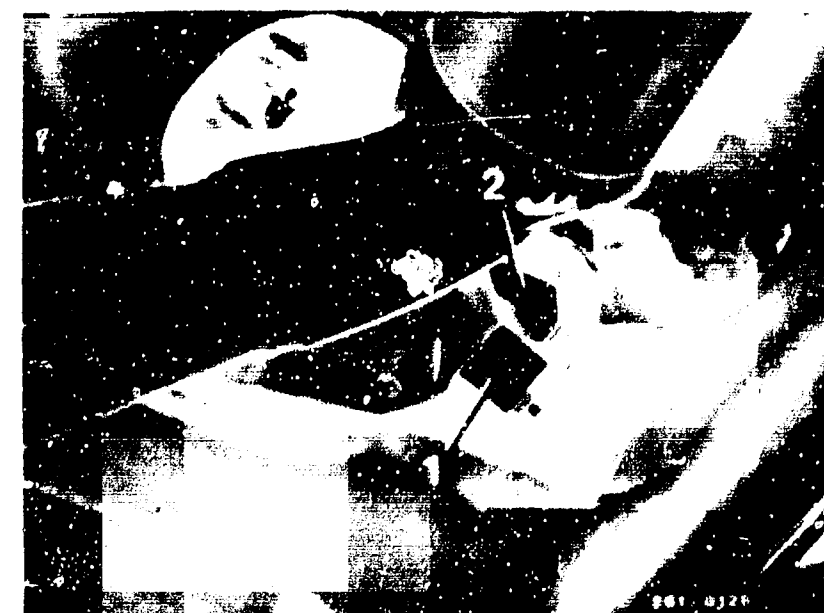
No signal or signal too small:

- Cranking speed below 200 min<sup>-1</sup>; charge battery.

Continued on D3/D4



1 = Engine-speed sensor  
2 = Reference-mark sensor



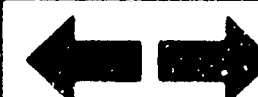
D1

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D2

Test with universal test adapter  
Alfa Romeo Quadrifoglio



Trouble-shooting for test step 16 (continued)

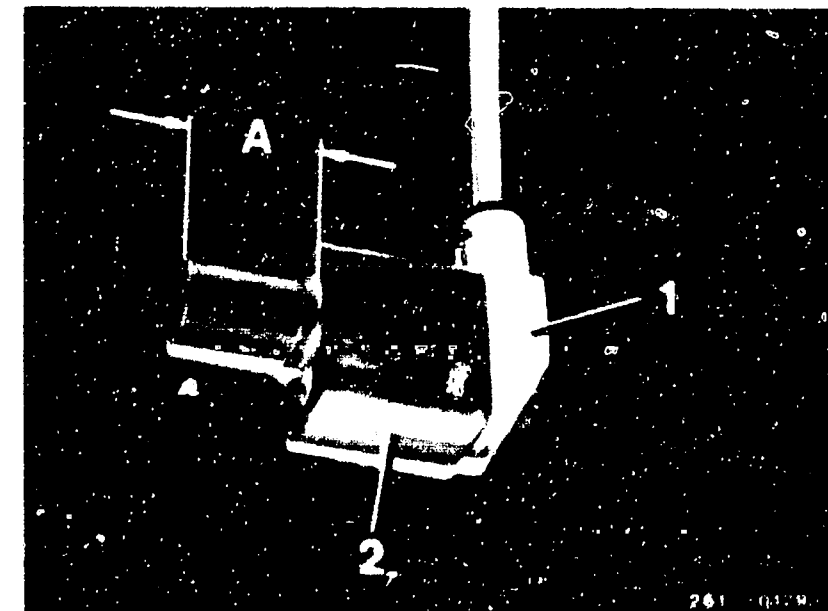
- Test air gap (nominal dimension 0.8 mm) with engine installed as follows:

On removed engine-speed sensor, measure length A with depth gauge. Make note of measurement. Using depth gauge, measure bore depth as far as head of tooth. Do not measure into tooth gap.

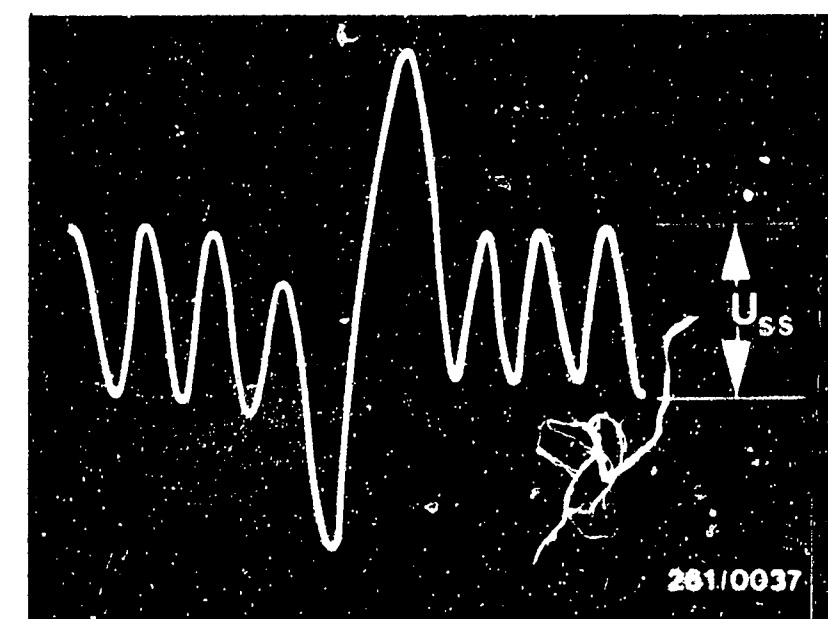
The difference of both dimensions (bore depth minus length of sensor) must be between 0.1 and 0.8 mm.

- If signal incorrect (greatly extended in picture):  
Heavily damaged tooth on starting-motor ring gear. Replace ring gear.
- Replacing the engine-speed sensor:  
To replace the sensors, undo plug-in connection and unscrew hexagon-socket-head cap screw on sensor. Remove dirt deposits on sensor. If necessary, apply two screwdrivers to recesses on left and right on sensor and lift sensor.

Continued on D 5 / D 6



1 = Sensor  
2 = Mounting block



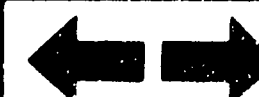
**D3**

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**D4**

Test with universal test adapter  
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### Trouble-shooting for test step 16 (continued)

Before installing the sensors, make sure that there are no metallic parts sticking to the sensor (sensors contain permanent magnets). Grease sensors with "Molykote Longterm 2".

**Do not mix up sensors when installing!**

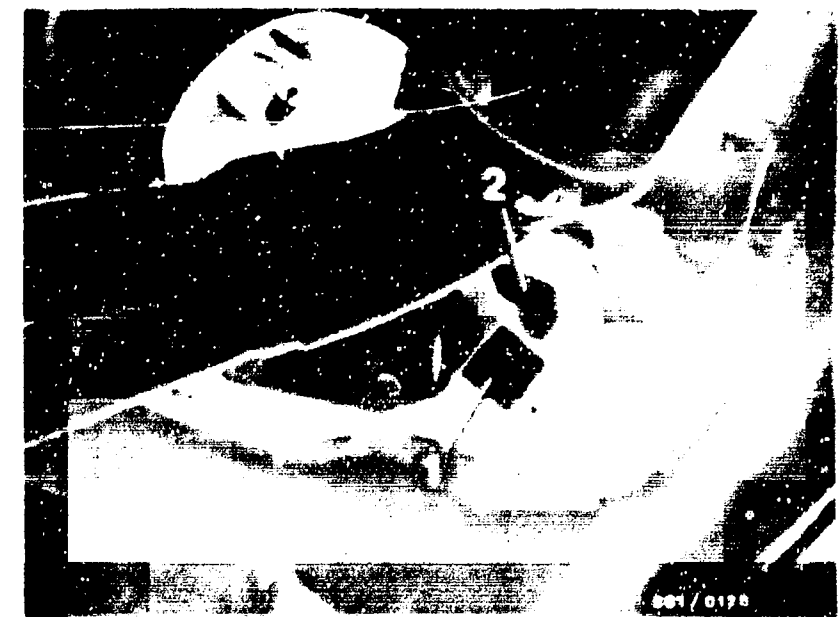
Plug reference-mark sensor onto gray plug.

The sensors are plugged into the mounting block and then into the correct bore in the starting-motor ring gear housing. Do not use force when inserting. Screw down sensors.

When mounting, ensure that the connectors are not mixed up.

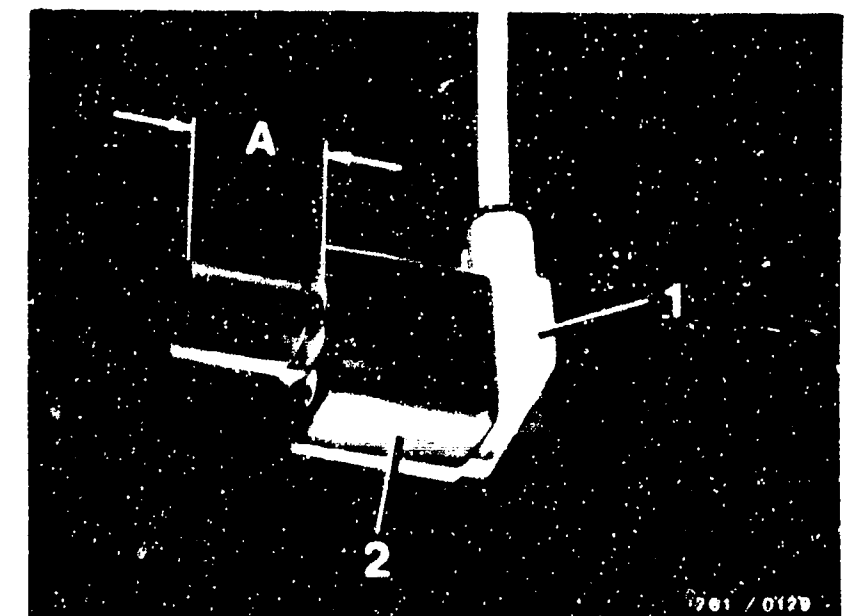
Make sure that the connectors are properly seated and that the spring contacts latch into the plug.

Spring contacts must not allow themselves to be pushed back.



1 = Reference-mark sensor  
2 = Engine-speed sensor

1 = Sensor  
2 = Mounting block



**D5**

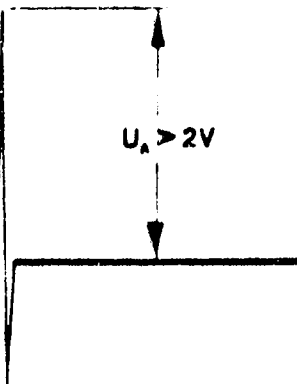
Test with universal test adapter



D6

Test with universal test adapter

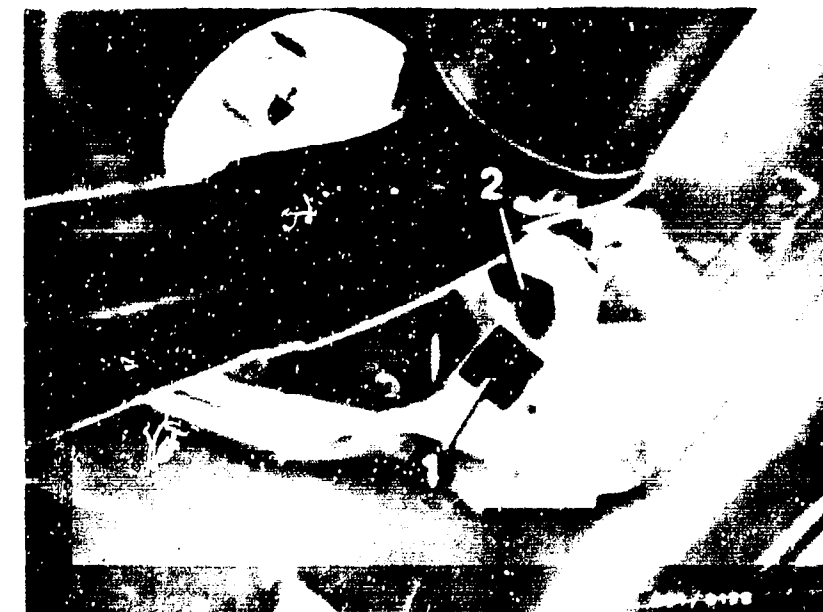


Test step 17			
Operation		Reading	Testing
Program switch "V" at position:	2		Component: Reference-mark sensor
Program switch "0" at position:	15		
Measuring equipment: Motortester, oscilloscope		Automatic and manually -shifted transmission Lever to left-hand stop (calibrated voltage range)  If reading OK, continue testing with test step 20. (Test steps 18 and 19 deleted).	Operation: Amplitude (signal) at terminals 25 and 26
Measuring range: Special input			Malfunction:  No signal or signal too small. Incorrect signal.
Connection: Test wells; red clip to red well, black clip to black well			
Operation in vehicle: Shift gear to neutral and operate starting motor			

#### Trouble-shooting:

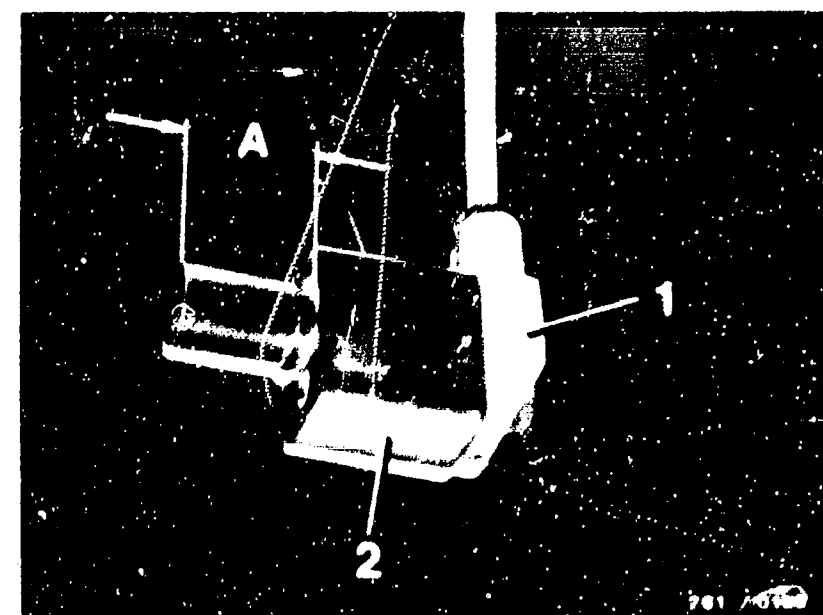
- No signal or signal too small:  
Cranking speed less than 200 min<sup>-1</sup>; battery insufficiently charged.
- Test air gap (nominal dimension 0.8 mm) with engine installed as follows:  
With sensor removed, measure length A with depth gauge. Make note of dimension. Bring reference mark toward reference-mark sensor bore by turning the starting-motor ring gear with a screwdriver etc. Using depth gauge, measure bore depth as far as reference mark. The difference of both dimensions (bore depth minus sensor length A) must be between 0.1 and 0.8 mm.

Continued on D 9 / D 10



1 = Reference-mark sensor  
2 = Engine-speed sensor

1 = Sensor  
2 = Mounting block



**D7**

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**D8**

Test with universal test adapter  
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# Trouble-shooting for test step 17 (continued)

## • Replacing the reference-mark sensor:

To replace the sensors, undo plug-in connection and unscrew hexagon-socket-head cap screw on sensor. Remove dirt deposits on sensor. If necessary, apply two screwdrivers to the recesses on left and right on the sensor and lift sensor.

Before installing the sensors, make sure that there are no metallic parts sticking to the sensor (sensors contain permanent magnets). Grease sensors with "Molykote Longterm 2".

Do not mix up sensors when installing!

Plug reference-mark sensor onto gray plug.

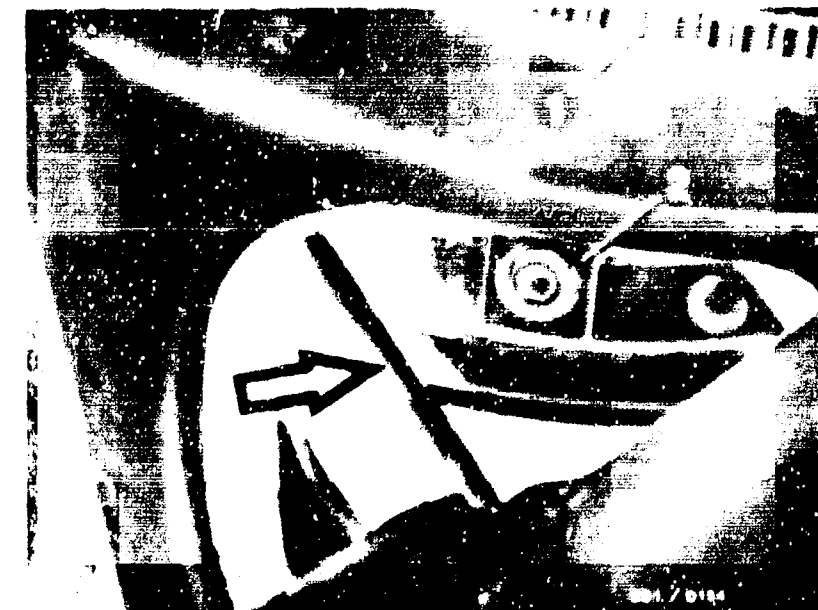
The sensors are plugged into the mounting block and then into the correct bore in the starting-motor ring gear housing. Do not use force when inserting. Screw down sensors.

When mounting, ensure that the connectors are not mixed up.

Make sure that the connectors are properly seated and that the spring contacts latch into the plug.

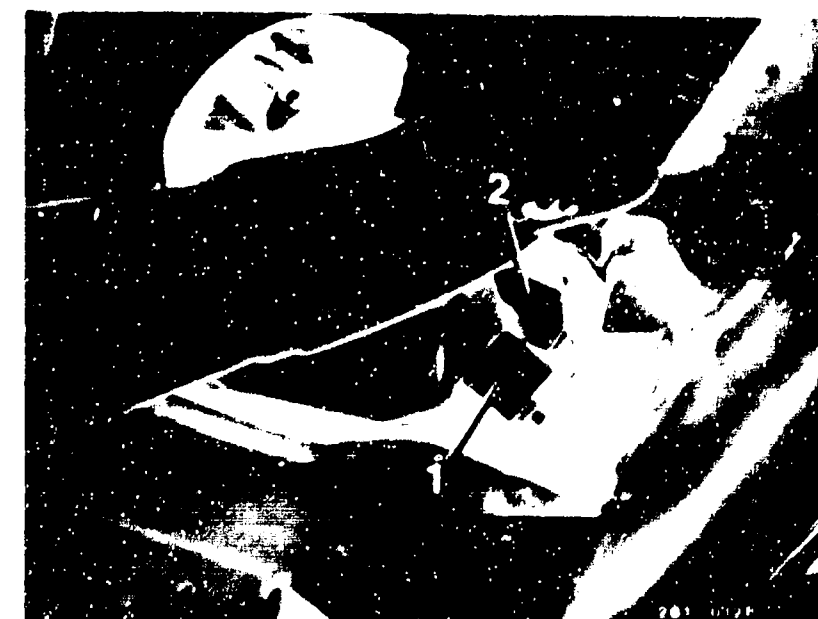
Spring contacts must not allow themselves to be pushed back.

Continued on D 11 / D 12



1 = Ring gear  
2 = Reference mark  
(viewed with mirror (arrow))

1 = Reference-mark sensor  
2 = Engine-speed sensor



D9

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D10

Test with universal test adapter  
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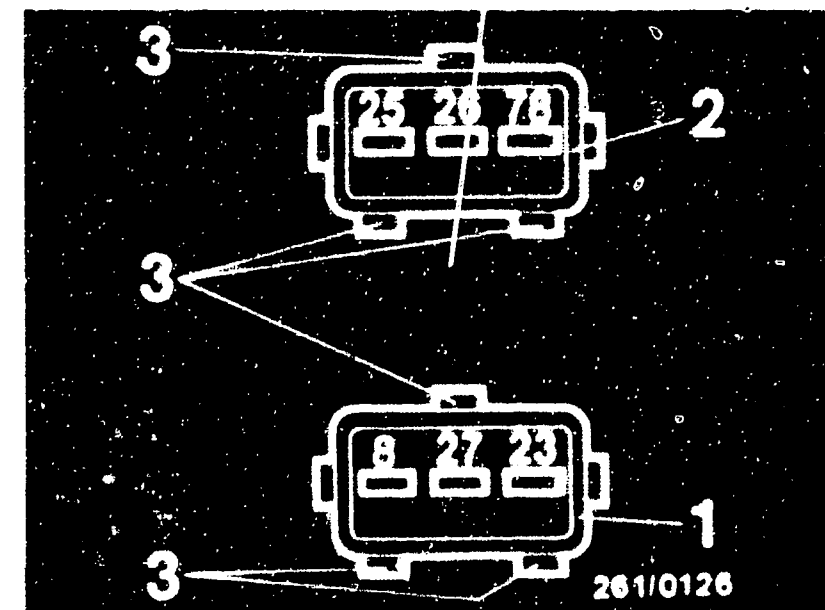


Trouble-shooting - test step 17 (continued)

• Incorrect signal:

Signal incorrect if negative peak comes first.

Check assignment of leads according to circuit diagram and illustration opposite.



Top view of sensor connectors

1 = Connector of engine-speed sensor

2 = Connector of reference-mark sensor with marking

3 = Locating lugs

78, 25, 26, 23, 8, 27 = Terminal numbers

**D11**

Test with universal test adapter

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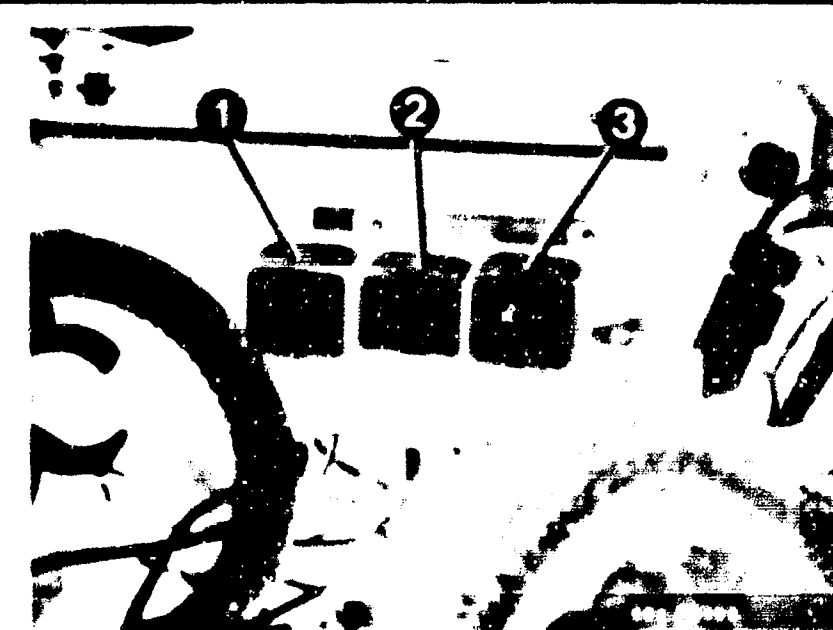
**D12**

Test with universal test adapter

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Test step 17		(Test steps 18 and 19 deleted)	
Operation		Reading	Testing
Program switch "V" at position:	6	Multimeter must indicate: <u>10 ... 15 V</u>	<u>Components:</u> Relay 2 (main relay)
Program switch "I" at position:	15		
<u>Measuring equipment:</u> Multimeter (V range)			If reading OK, continue testing with <u>next test step</u>
<u>Measuring range:</u> 10 V			
Connection: Test sockets, (red = +, black = ground)	V		
<u>Operation in vehicle:</u> Switch on ignition			



- 1 = Relay 1 (relay)  
2 = Relay 2 (main relay)  
3 = Relay 3 (camshaft energization)

Arrow = Fuse No. 8 for Motronic



#### Trouble-shooting:

1. Voltage less than 10 V: Battery insufficiently charged or high voltage drops at terminals.

2. No voltage reading: Check fuse No. 8 and relay 2.

Perform the following voltage measurements at the relay with the ignition on:

- Measure battery voltage at Term. 87 (2x), Term. 86 and Term. 30.  
Measure ground connection Term. 85 to B+ (test adapter connected).
- Check lead from relay 2 term. 87 to multiple plug term. 35.
- Check Motronic ground terminal (no. 5), also lead 5/2.

Note: If replacing relay 2, make sure that only relay with blocking diode is installed. Note symbol on relay housing.

**D 13**

Test with universal test adapter  
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**D 14**

Test with universal test adapter  
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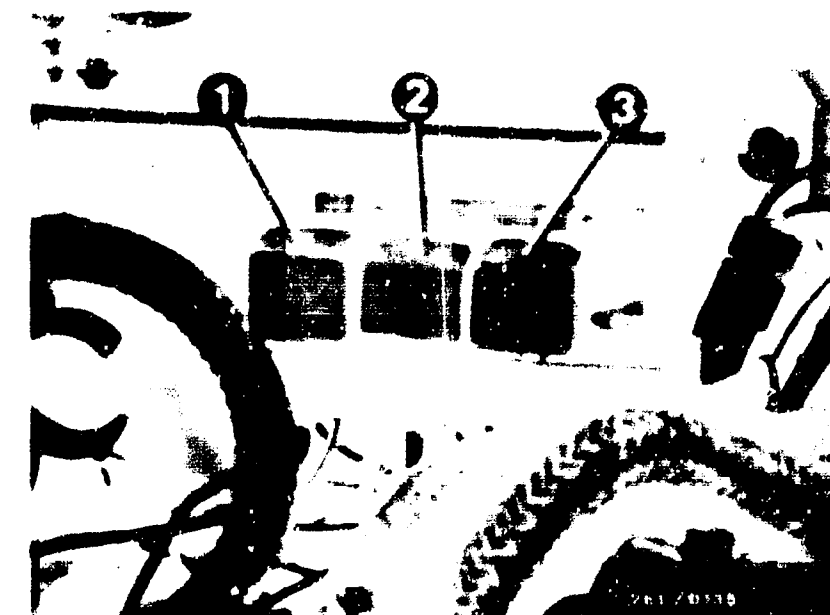


Test step 21		Reading	Testing
Operation			
Program switch "V" at position:	7	Multimeter must indicate 10 ... 15 V	Components:  Relay 2 (main relay)
Program switch "I" at position:	15		
Measuring equipment: Multimeter (V range)			Operation: Supply voltage for control unit at terminals 18 (+) and 5 (ground)
Measuring range: 15 V		If reading OK, continue testing with next test step	
Connection: Test sockets, Red = (+), Black = ground	V		Malfunction: Voltage less than 10 V
Operation in vehicle: Switch on ignition			

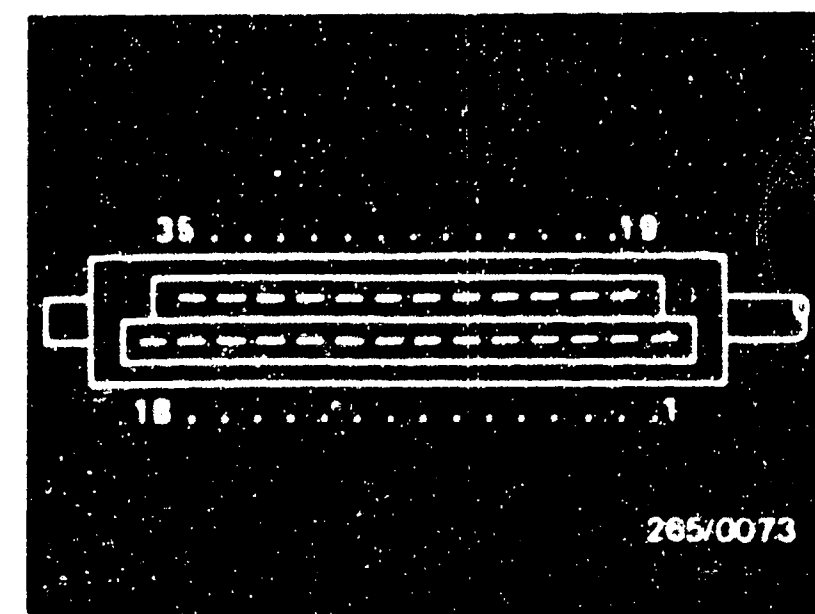
#### Trouble-shooting:

- Check lead from multiple plug term. 18 to relay 2 term. 87 test.

Note: If replacing relay 2, make sure that only a relay with blocking diode is installed. Note symbol on relay housing.



- 1 = Relay 1 (relay)
- 2 = Relay 2 (main relay)
- 3 = Relay 3 (camshaft energization)



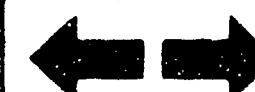
**D 15**

Test with universal test adapter  
Alfa Romeo Quadrifoglio

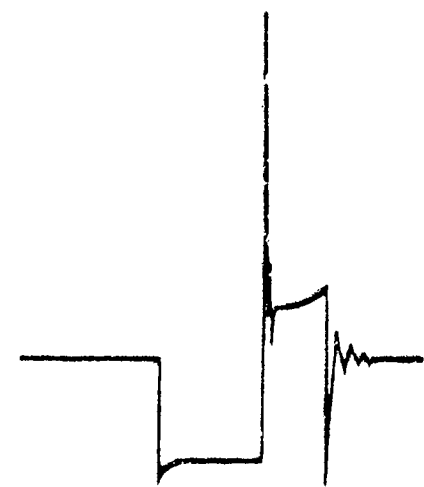


**D 16**

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Test step 22 Ignition off. Connect control unit.

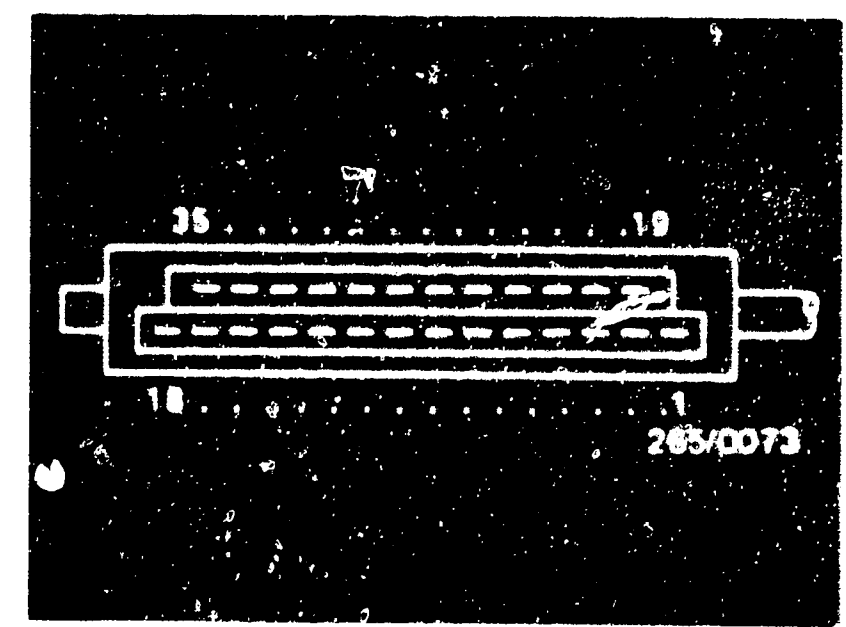
Operation		Reading	Testing
Program switch "V" at position:	5	<div>Primary signal present</div> 	<u>Component:</u>  Ignition coil, H.T. ignition cables, control unit
Program switch "I" at position:	15		
<u>Measuring equipment:</u> H. tester, oscilloscope			<u>Operation:</u>  Primary signal from ignition coil terminal 1 to ground
<u>Measuring range:</u> Special input			<u>Malfunction:</u>  No signal or incorrect signal.
Correction: Test wells; red clip to red well, black clip to black well, triggering on cylinder 1		If reading OK, continue testing with next test step	
<u>Operation in vehicle:</u> Shift gear to neutral and operate starting motor			

Trouble-shooting:

- Test Motronic ground terminals:  
Terminals must be bare and screws must be tight.
- Test ignition coil including cables and high-voltage lines.  
It must not be possible to push back spring contact on multiple plug term. 1.
- Check lead from ignition coil term. 15 to ignition lock term. 15.
- Replace control unit.

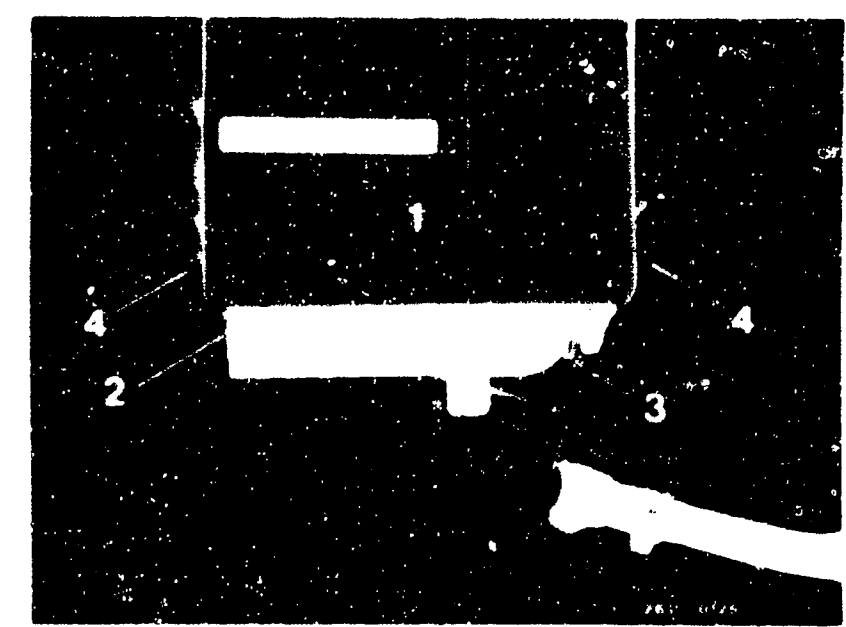
Note:

To rule out confusion of control units between the various systems, a mechanical locking system has been introduced. The "lug" (pivot point when opening and connecting the control unit) and the corresponding mount of the control unit have matching recesses/pins.



Top view of 35-pin multiple plug

- 1 = Control unit
- 2 = Locating lug
- 3 = Detent
- 4 = Mounting hole



# Test step 23

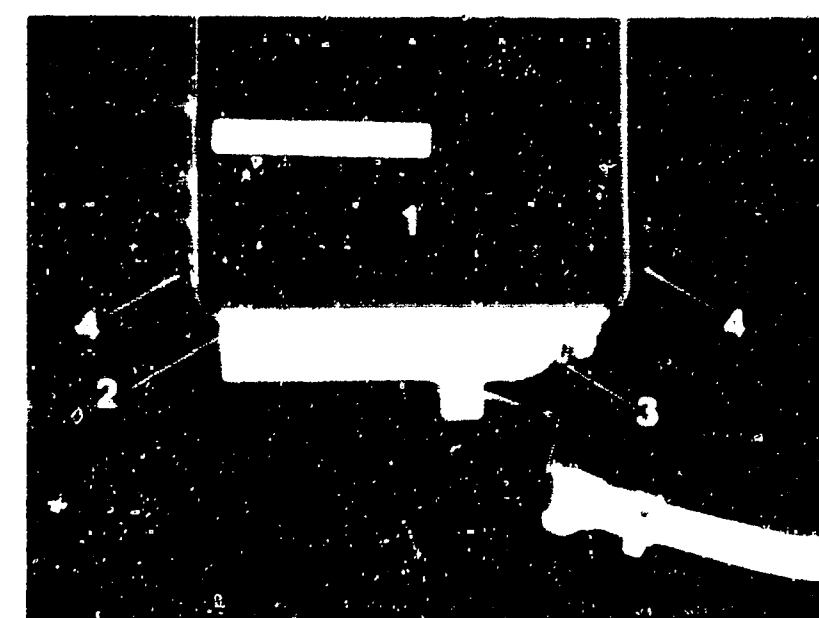
Operation		Reading	Testing
Program switch "V" at position:	8	Multimeter must indicate  <u>greater than 8 V</u>  <	

## Trouble-shooting:

- Replace control unit

## Note

In order to rule out any confusion between the control units of the various systems, a mechanical locking device has been introduced. The "locating lug" (pivot point when opening and connecting the control unit) and the corresponding mounting point on the control unit have matching recesses and pins.



- 1 = Control unit
- 2 = Locating lug
- 3 = Detent
- 4 = Mounting holes





Test step 24			
Operation		Reading	Testing
Program switch "V" at position:	9	Multimeter must indicate  150...250 mV	Component:  Air-flow sensor
Program switch " " at position:	15	With air-flow sensor flap closed. Loosen hose from air-flow sensor and open sensor flap by hand. Sensor flap must not catch and must return automatically to rest position when released. With sensor flap fully open the reading rises to above 7 V (change over measuring range).	
Measuring equipment: Multimeter (V range)		If reading OK, continue testing with test step 27. Test steps 25 and 26 deleted.	Operation:  Divider voltage at terminal 7 and ground
Measuring range			Malfunction:  No voltage or voltage too low
1.5 V			
Connection: Test sockets (red = +, black = ground)	V		
Operation in vehicle: Switch on ignition			

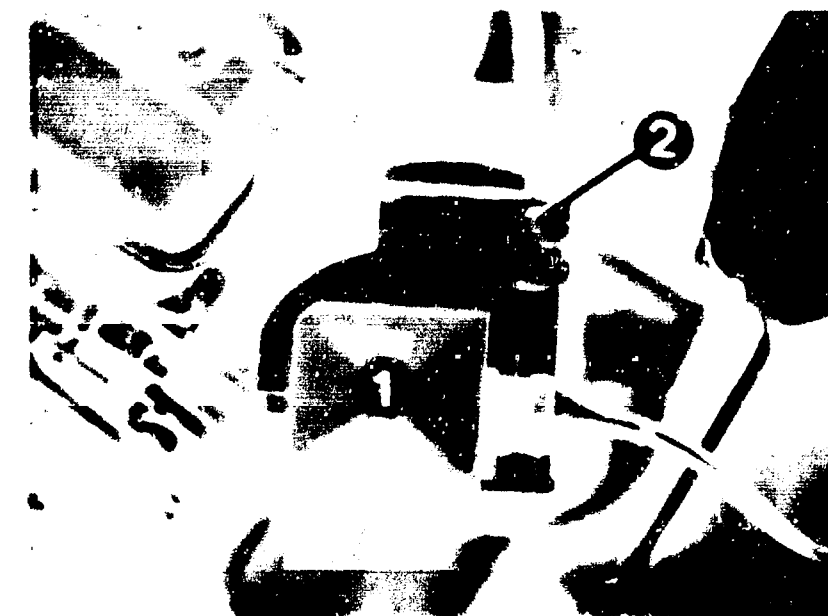
#### Trouble-shooting:

##### No reading:

- Check leads from air-flow sensor Term. 6, 7 and 9 to multiple plug Term. 6, 7 and 9.
- Spring contacts must not allow themselves to be pushed back.

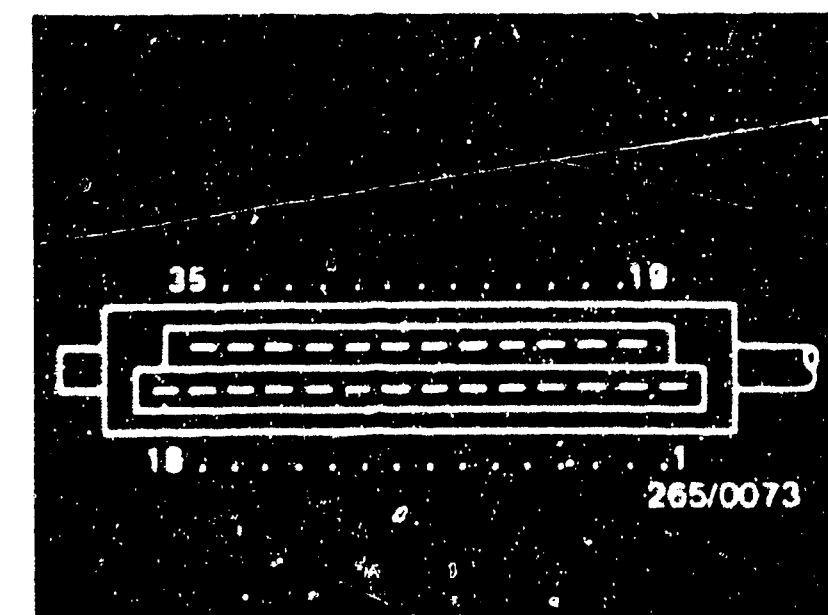
##### If reading outside tolerance:

- Check whether air-flow sensor flap is closing fully.
- Replace air-flow sensor.



1 = Air-flow sensor with NTC I  
2 = Idle-mixture-adjusting screw

Top view of 35-pin multiple plug of Motronic wiring harness



**D21**

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**D22**

Test with universal test adapter

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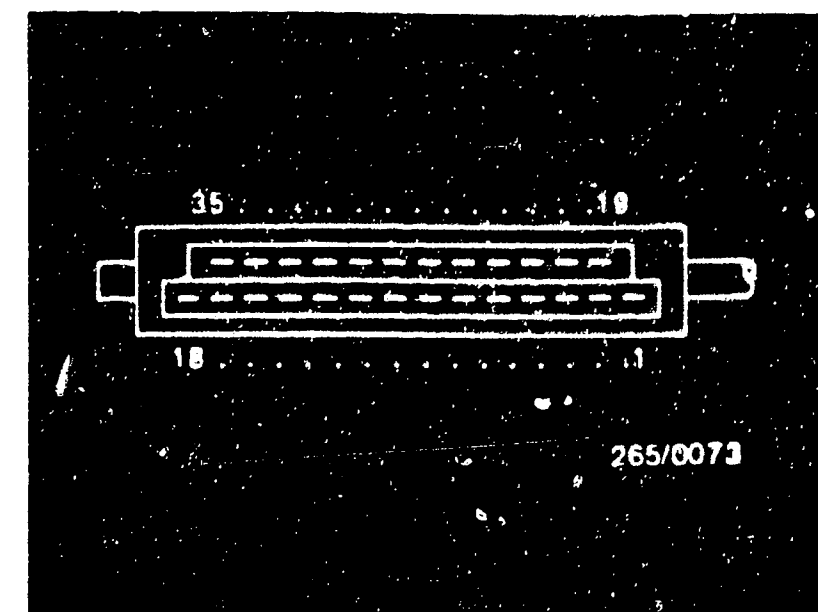
Test steps 25 and 26 deleted

Test step 27			
Operation		Reading	Testing
Program switch "V" at position:	12	Multimeter must indicate <u>8...15 V</u> during cranking.	<u>Component:</u> Lead 4 from starting motor- Term. 50 to multiple plug Term. 4
Program switch "..." at position:	15		
Measuring equipment:			
Multimeter (V range)		If reading OK, continue testing with next test step.	<u>Operation:</u> Voltage test at terminal 4
Measuring range:			
15 V			
Connection: Test sockets (red = +, black = ground)	V		<u>Malfunction:</u> Voltage less than 8 V
Operation in vehicle:			
Shift gear to neutral and operate starting motor.			

#### Trouble-shooting:

##### 1. Voltage less than 8 V:

- Test voltage drop at starting motor terminal 50.
- Check lead from multiple plug terminal 4 to starting motor terminal 50.



Top view of 35-pin multiple plug of Motronic wiring harness

**D23**

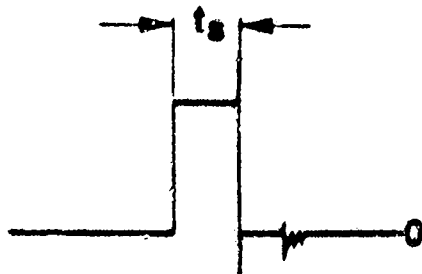
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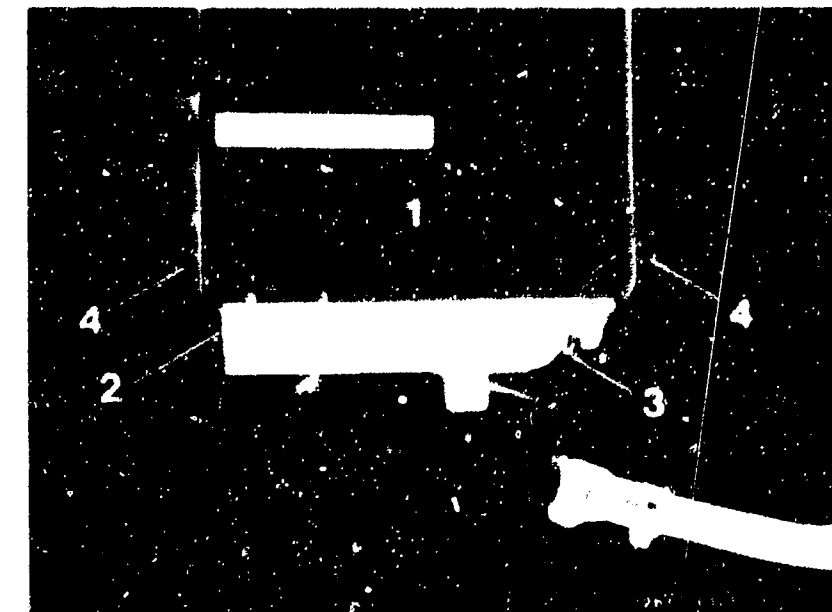


**D24**

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Test step 28			
Operation		Reading	Testing
Program switch "V" at position:	13		<u>Component:</u> Control unit
Program switch "G" at position:	15		
Measuring equipment: Motortester, oscilloscope		$t_s$ = Dwell period 0 = Base line	<u>Operation:</u> Dwell-period signal at terminal 21 and ground
Measuring range: Special input			
Connection: Test wells; red clip to red well, black clip to black well			
Operation in vehicle: Shift gear to neutral and operate starting motor		If reading OK, continue testing with next test step.	<u>Malfunction:</u> No signal



- 1 = Control unit
- 2 = Locating lug
- 3 = Detent
- 4 = Mounting holes

#### Trouble-shooting:

- Replace control unit

#### Note:

In order to rule out any confusion between the control units of the various systems, a mechanical locking device has been introduced. The "locating lug" (pivot point when opening and connecting the control unit) and the corresponding mounting point on the control unit have matching recesses and pins

E1

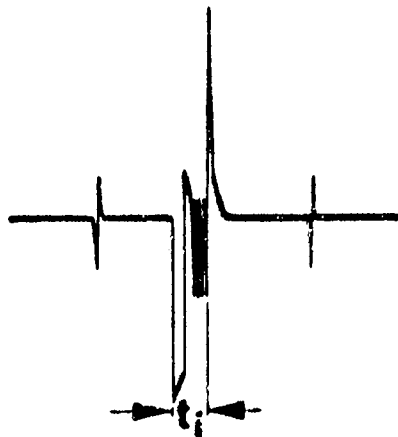
Test with universal test adapter  
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E2

Test with universal test adapter  
Alfa Romeo Quadrifoglio



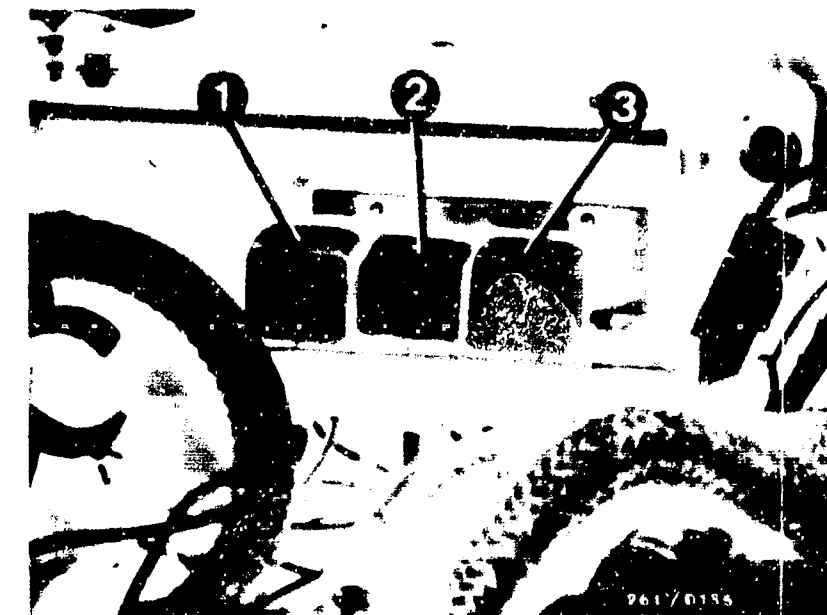
Test step 29		Reading	Testing	
Operation				
Program switch "V" at position:	14	  $t_i$ = Duration of injection	<u>Component:</u>  Fower supply for solenoid-operated injection valves, control unit	
Program switch "Ω" at position:	15			
Measuring equipment:				<u>Operation:</u>  Injection output stage at terminal 14 and ground
Motortester, oscilloscope				<u>Malfunction:</u>  No signal
Measuring range:				
Special input				
Connection: Test wells; red clip to red well, black clip to black well				
Operation in vehicle:		If reading OK, continue testing with next test step.		
Shift gear to neutral and operate starting motor				

#### Trouble-shooting:

- Check power supply to injection valves:  
Remove connector from all solenoid-operated injection valves and measure voltage to ground at both terminals. Battery voltage must be measured at each solenoid-operated injection valve connector. If no voltage, test leads from injection-valve connectors to main relay term. 87.
- Test lead from multiple plug Term. 14 to injection valves of cylinders 3 and 4.
- Replace control unit.

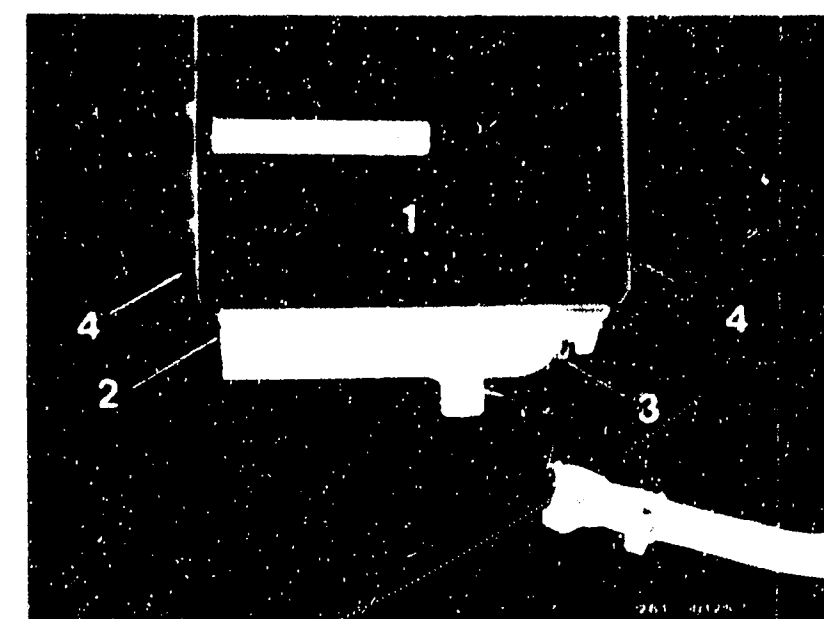
#### Note:

In order to rule out any confusion between the control units of the various systems, a mechanical locking device has been introduced. The "locating lug" (pivot point when opening and connecting the control unit) and the corresponding mounting point on the control unit have matching recesses and pins.



- 1 = Relay 1 (pump relay)
- 2 = Relay 2 (main relay)
- 3 = Relay 3 (camshaft energization)

- 1 = Control unit
- 2 = Locating lug
- 3 = Detent
- 4 = Mounting holes



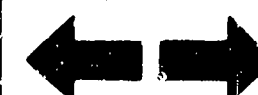
**E3**

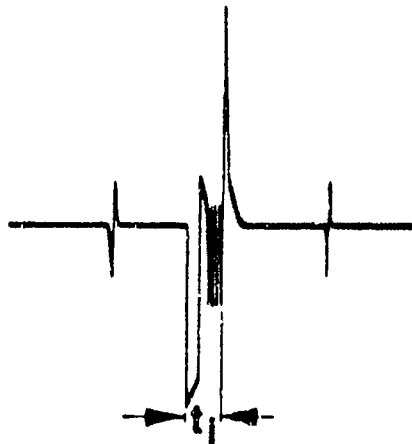
Test with universal test adapter  
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**E4**

Test with universal test adapter  
Alfa Romeo Quadrifoglio



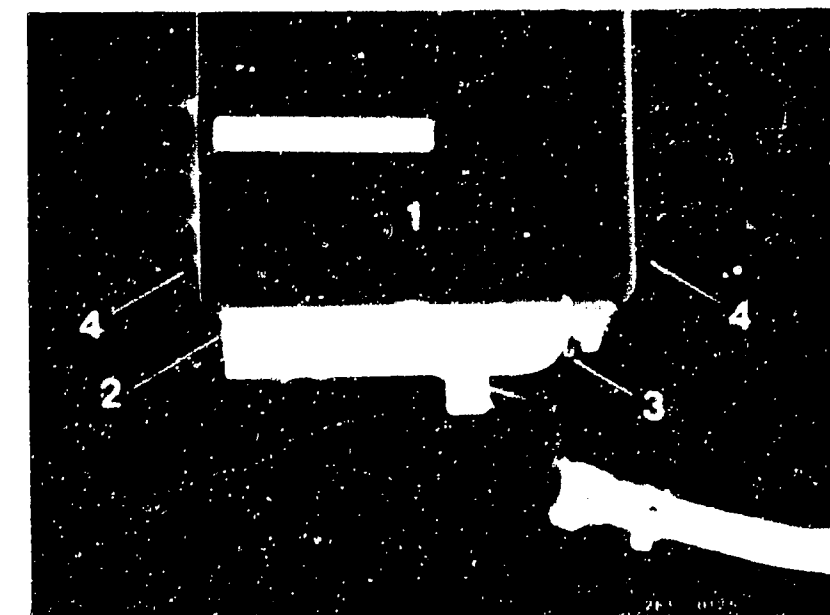
Test step 30			
Operation		Reading	Testing
Program switch "V" at position:	14	Duration of injection $t_i$ becomes slightly longer after pressing button T1 (NTC II, cold). <u>Only press T1 briefly; otherwise mixture will be too rich for engine.</u>	<u>Component:</u>  Control unit
Program switch "Q" at position:	15		
Measuring equipment:			<u>Operation:</u>  Influence of temperature
Motortester, oscilloscope			
Measuring range:			
Special input			<u>Malfunction:</u>  Signal does not become wider after pressing button T1
Connection: Test wells; red clip to red well, black clip to black well			
Operation in vehicle:			
Shift gear to neutral and operate starting motor		$t_i$ = Duration of injection	
Button:			
Press T1			

#### Trouble-shooting:

Replace control unit

#### Note:

In order to rule out any confusion between the control units of the various systems, a mechanical locking device has been introduced. The "locating lug" (pivot point when opening and connecting the control unit) and the corresponding mounting point on the control unit have matching recesses and pins.



- 1 = Control unit
- 2 = Locating lug
- 3 = Detent
- 4 = Mounting holes

**E5**

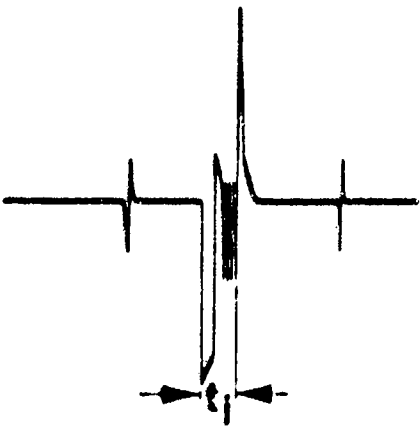
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**E6**

Test with universal test adapter  
Alfa Romeo Quadrifoglio



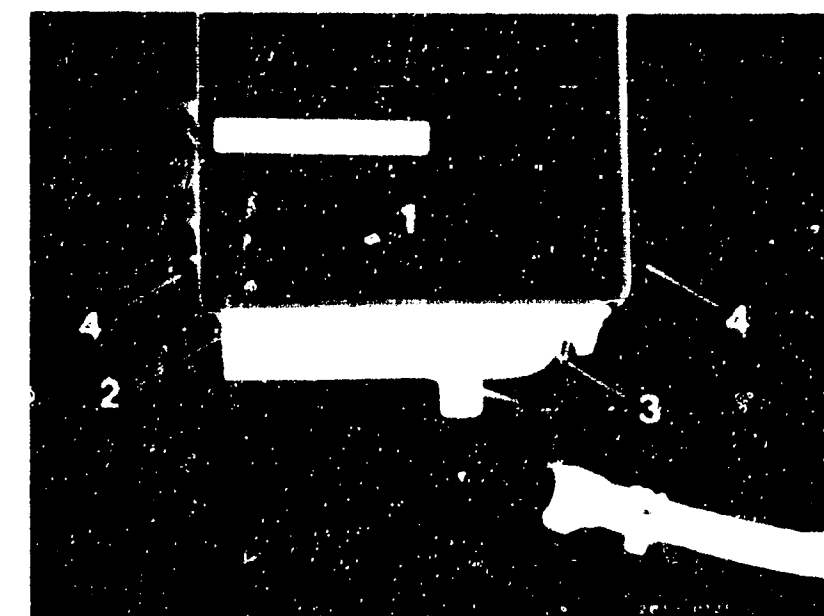
Test step 31		Reading	Testing
Operation			
Program switch "V" at position:	15	 <p><math>t_i</math> = Duration of injection</p> <p>If reading OK, continue testing with next test step.</p>	<u>Component:</u> Control unit
Program switch "Q" at position:	15		<u>Operation:</u> Injection output stage at terminal 15 and ground
Measuring equipment: Motortester, oscilloscope			<u>Malfunction:</u> No signal
Measuring range: Special input			
Connection: Test wells; red clip to red well, black clip to black well			
Operation in vehicle: Shift gear to neutral and operate starting motor			

#### Trouble-shooting:

- Check power supply to injection valves:  
Remove connector from all solenoid-operated injection valves and measure voltage to ground at both terminals. Battery voltage must be measured at each solenoid-operated injection valve connector. If no voltage, test leads from injection-valve connectors to main relay term. 87.
- Test lead from multiple plug Term. 15 to injection valves of cylinders 1 and 2.
- Replace control unit.

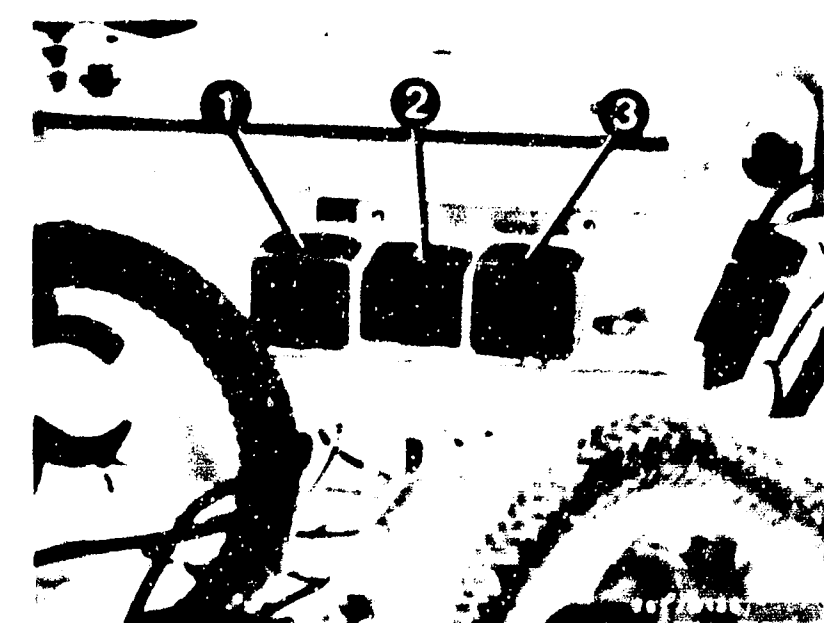
#### Note:

In order to rule out any confusion between the control units of the various systems, a mechanical locking device has been introduced. The "locating lug" (pivot point when opening and connecting the control unit) and the corresponding mounting point on the control unit have matching recesses and pins.



- 1 = Control unit
- 2 = Locating lug
- 3 = Detent
- 4 = Mounting holes

- 1 = Relay 1 (pump relay)
- 2 = Relay 2 (main relay)
- 3 = Relay 3 (camshaft energization)



**E7**

Test with universal test adapter

Alfa Romeo Quadrifoglio

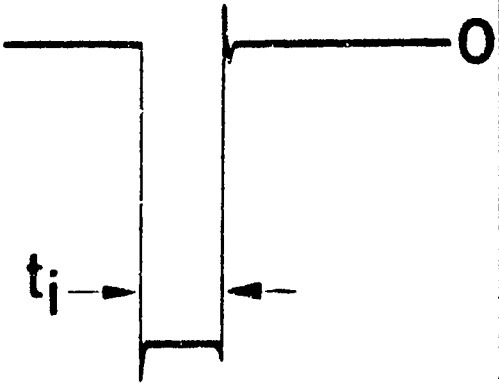


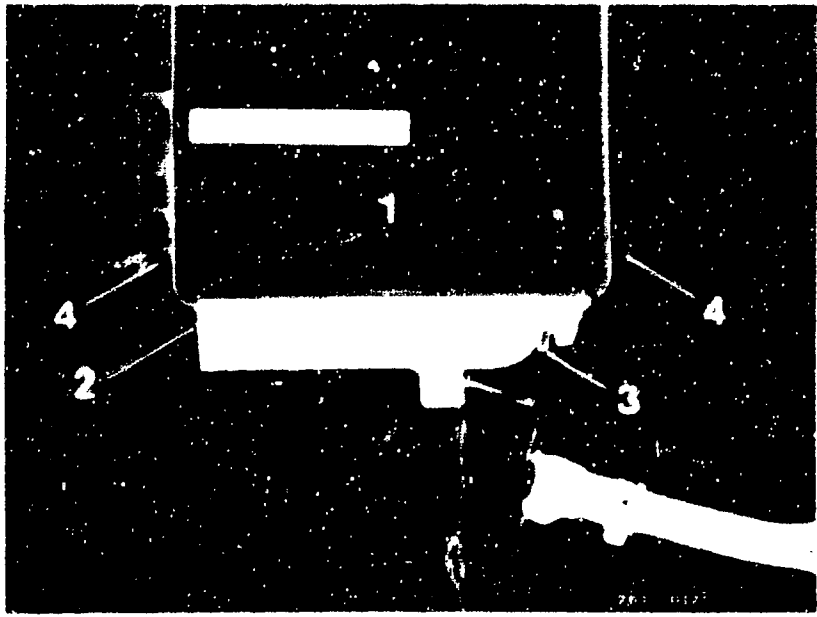
**E8**

Test with universal test adapter

Alfa Romeo Quadrifoglio



Test step 32			
Operation		Reading	Testing
Program switch "V" at position:	16	 <p><math>t_i</math> = Duration of injection 0 = Base line</p> <p>If reading OK, continue testing with next test step.</p>	<u>Component:</u> Control unit
Program switch "Ω" at position:	15		
Measuring equipment:			<u>Operation:</u> Injection signal at terminal 11 and ground
Measuring range:			<u>Malfunction:</u> No signal
Special input			
<u>Connection:</u> Test wells; red clip to red well, black clip to black well			
<u>Operation in vehicle:</u> Shift gear to neutral and operate starting motor			



- 1 = Control unit
- 2 = Locating lug
- 3 = Detent
- 4 = Mounting holes

Trouble-shooting:

Replace control unit.

Note:

In order to rule out any confusion between the control units of the various systems, a mechanical locking device has been introduced. The "locating lug" (pivot point when opening and connecting the control unit) and the corresponding mounting point on the control unit have matching recesses and pins

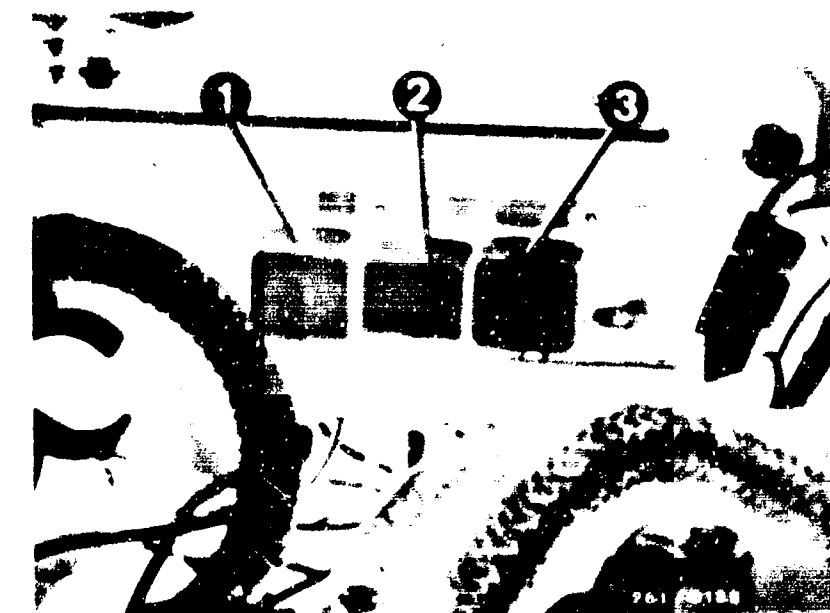
Test step 33 Relay 1 (pump relay) connect.			
Operation		Reading	Testing
<u>Program switch "V"</u> at position:	17	Multimeter must indicate <u>10 ... 15 V</u>  	

#### Trouble-shooting:

- Replace relay 1.
- Test lead from multiple plug term. 20 to relay 1 term. 85.
- Replace control unit.

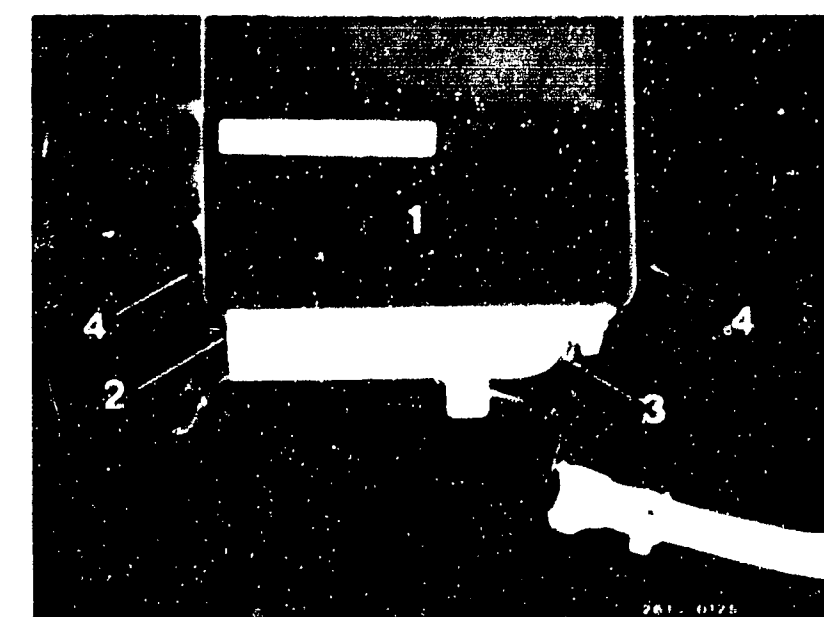
#### Note:

In order to rule out any confusion between the control units of the various systems, a mechanical locking device has been introduced. The "locating lug" (pivot point when opening and connecting the control unit) and the corresponding mounting point on the control unit have matching recesses and pins.



- 1 = Relay 1 (pump relay)
- 2 = Relay 2 (main relay)
- 3 = Relay 3 (camshaft energization)

- 1 = Control unit
- 2 = Locating lug
- 3 = Detent
- 4 = Mounting holes



E11

Test with universal test adapter  
Alfa Romeo Quadrifoglio



E12

Test with universal test adapter  
Alfa Romeo Quadrifoglio





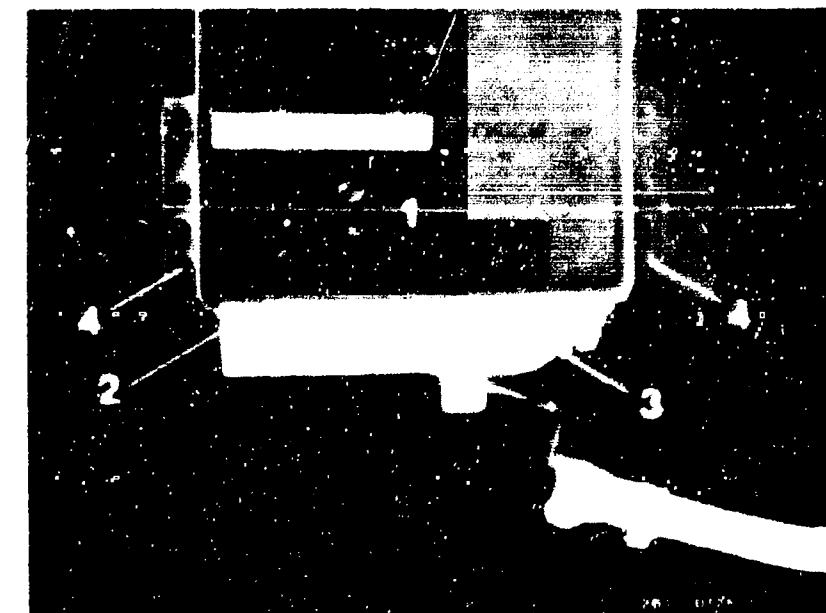
Test step 34			
Operation		Reading	Testing
Program switch "V" at position:	17	Multimeter must indicate  max. 4 V	Component:  Control unit
Program switch "Ω" at position:	15		
Measuring equipment: Multimeter (V range)			Operation:  Pump control Term. 20 to ground
Measuring range:  15 V			
Connection: Test sockets; (red = +, black = ground)	V	If reading OK, continue testing with next test step.	Malfunction:  Voltage greater than 4 V
Operation in vehicle: Shift gear to neutral and operate starting motor			

#### Trouble-shooting:

Replace control unit

#### Note:

In order to rule out any confusion between the control units of the various systems, a mechanical locking device has been introduced. The "locating lug" (pivot point when opening and connecting the control unit) and the corresponding mounting point on the control unit have matching recesses and pins.



- 1 = Control unit
- 2 = Locating lug
- 3 = Detenting
- 4 = Mounting holes

**E13**

Test with universal test adapter  
Alfa Romeo Quadrifoglio



**E14**

Test with universal test adapter  
Alfa Romeo Quadrifoglio



Test step 35		
Operation		Reading
Program switch "V" at position:	17	Pressure gauge must indicate <u>2.8 ... 3.2 bar</u>
Program switch "a" at position:	15	
<u>Measuring equipment:</u> Pressure gauge		If reading OK, continue testing with <u>next test step.</u>
<u>Measuring range:</u> 0 to 6 bar		
<u>Connection:</u> At test connection		
<u>Operation in vehicle:</u> Switch on ignition		
<u>Button:</u> Press T3		

Testing
<u>Component:</u> Pump relay, fuel pump, pressure regulator
<u>Operation:</u> Fuel pressure
<u>Malfunction:</u> No fuel pressure or pressure outside tolerance

Note:

Install pressure gauge into fuel inlet to fuel-distribution pipe.

Caution!

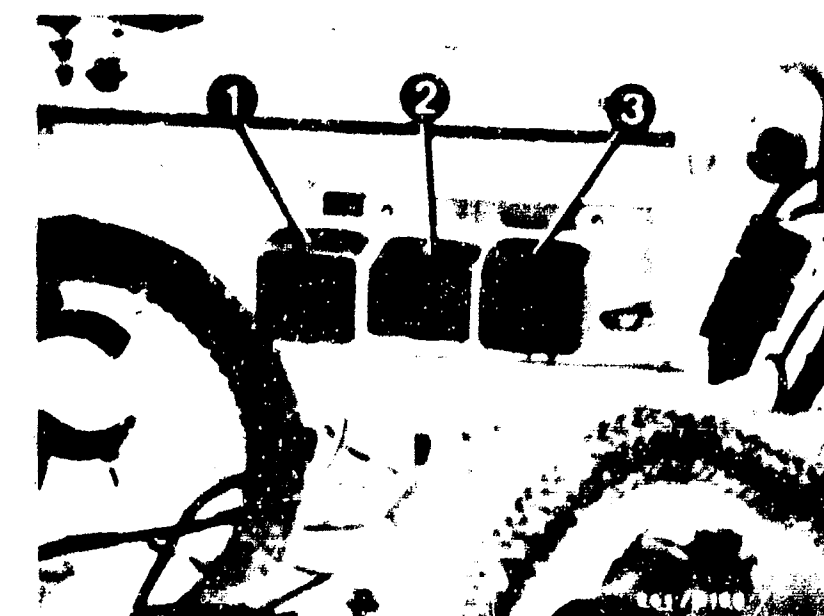
Catch escaping gasoline. Danger of fire with hot engine and electric sparks.

Continued on E17/E18



Arrow = Pressure gauge

- 1 = Relay 1 (pump relay)
- 2 = Relay 2 (main relay)
- 3 = Relay 3 (camshaft energization)



**E15**

Test with universal test adapter  
Alfa Romeo Quadrifoglio



**E16**

Test with universal test adapter  
Alfa Romeo Quadrifoglio



Fuel pressure test - test step 35 (continued)

1. Pressure 0 bar, no pumping noises can be heard:

- Test pump fuse.
- Replace relay set.
- Measure voltage at disconnected pump plug.

If no voltage:

Test lead from fuel pump to pump relay term. 87 as well as pump ground lead.

- If voltage present:

Test pressure regulator and fuel pump, as described under 2. below.

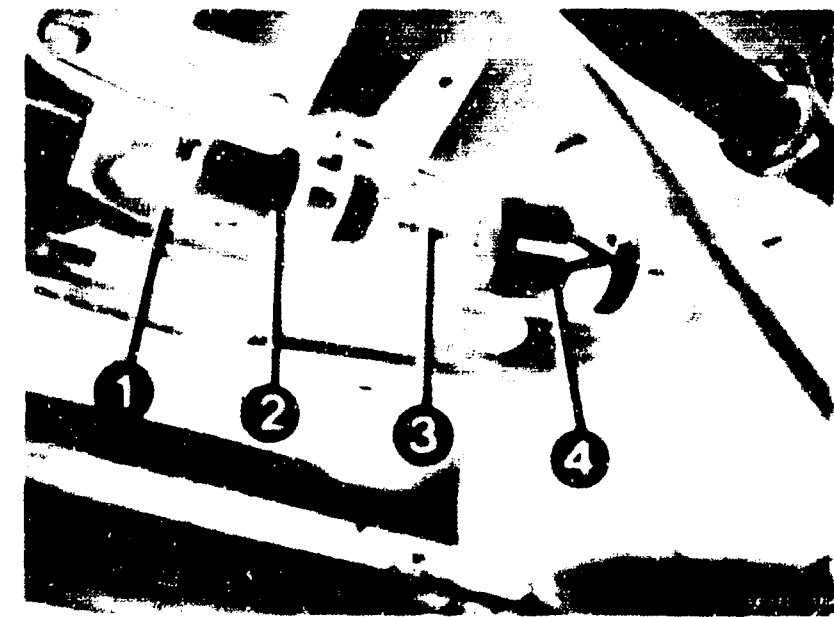
2. Pressure outside tolerance, fuel pump operating:

- Fuel pressure too low:

Slowly pinch off return line with hose clammer. If pressure rises above 4 bar, replace pressure regulator.

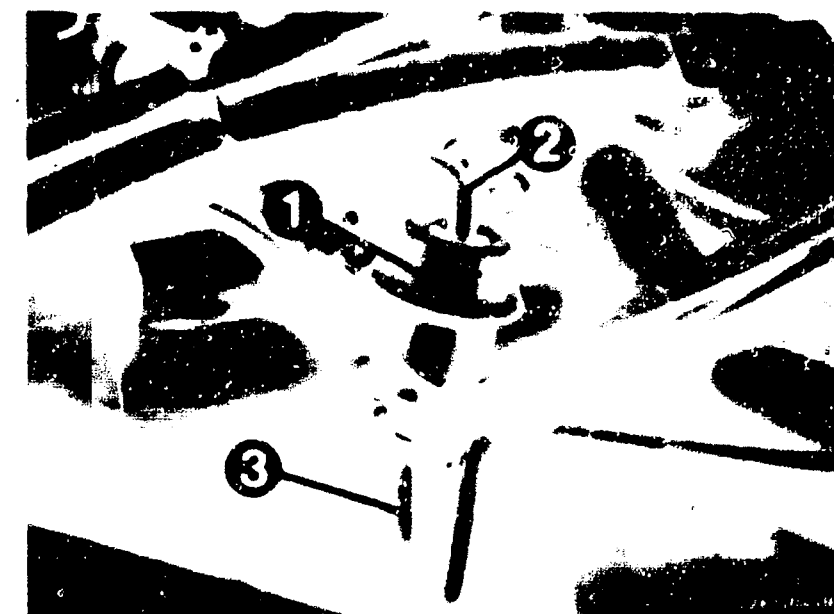
Pressure remains below 4 bar — replace fuel pump.

Continued E19/E20



- 1 = Fuel intake line
  - 2 = Electric fuel pump
  - 3 = Fuel delivery line
  - 4 = Fuel filter
- Arrow = Direction of flow

- 1 = Pressure regulator
- 2 = To intake manifold
- 3 = Fuel return line



**E17**

Test with universal test adapter

After engine shutdown



**E18**

Test with universal test adapter

After engine shutdown

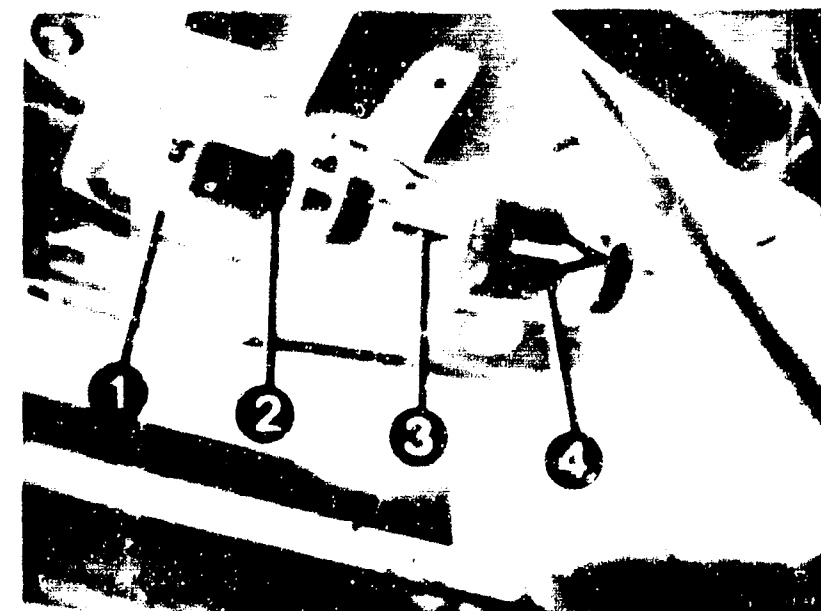


Trouble-shooting - test step 35 (continued)

- Check fuel line and fuel filter for throughflow. Fuel lines pinched?
- Strainer in tank clogged?
- Corrosion in tank?

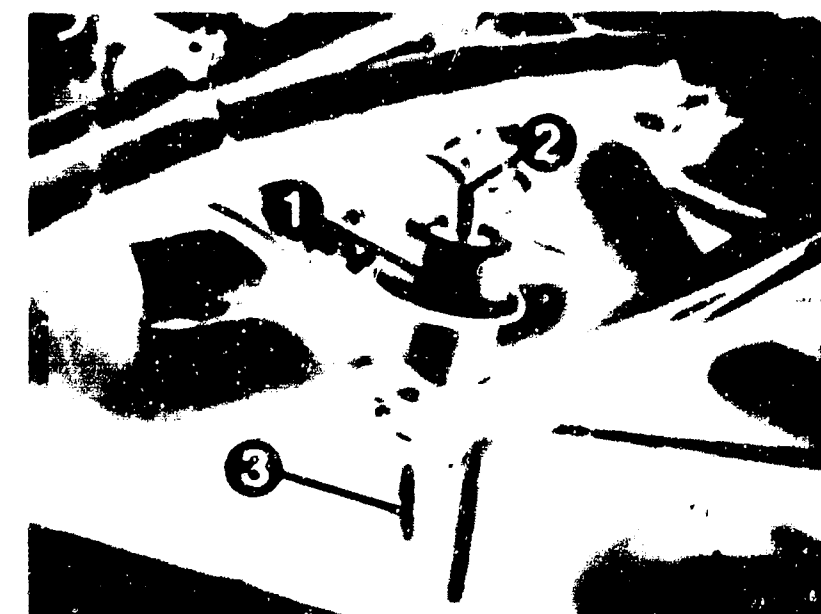
3. Fuel pressure above 3.2 bar:

- Fuel return line clogged or pinched.
- Replace pressure regulator



1 = Fuel intake line  
2 = Electric fuel pump  
3 = Fuel delivery line  
4 = Fuel filter  
Arrow = Direction of flow

1 = Pressure regulator  
2 = To intake manifold  
3 = Fuel return line



**E19**

Test with universal test adapter  
Alfa Romeo Quadrifoglio



**E20**

Test with universal test adapter  
Alfa Romeo Quadrifoglio



### CAUTION!

The following test steps can only be performed with the engine running.  
If the engine will not run, continue with the trouble-shooting program of your choice.  
Detailed trouble-shooting - see B3 - B4  
Direct trouble-shooting - See B5 - B10  
For further trouble-shooting, leave the test adapter, control unit and pressure gauge connected.

#### Test step 36 Connect motortester and CO analyzer

Operation		Reading	Testing
Program switch "V" at position:	17	1. With engine at normal operating temperature: Idle speed: 800 ... 900 min <sup>-1</sup>	<u>Component:</u>  Engine, leaks in air-intake system
Program switch "Q" at position:	15		
<u>Measuring equipment:</u> Motortester and CO analyzer		<u>CO concentration:</u> 0.5 ... 1.5 by Vol.CO	<u>Operation:</u>  Idle speed and exhaust
<u>Measuring range:</u> Engine speed and CO			
<u>Connection:</u> Ignition coil, exhaust			<u>Malfunction:</u>  Readings outside tolerance
<u>Operation in vehicle</u> Allow engine to reach operating temperature			
		2. Press button T2: Readings must not change.	
		If reading OK, continue testing with next test step.	

#### Trouble-shooting:

- Adjust idle speed at idle-speed-adjusting screw in throttle-valve assembly.

Continued on E23/E24



- 1 = Auxiliary-air device  
2 = Throttle-valve switch  
3 = Idle-speed adjusting screw

**E21**

Test with universal test adapter  
Alfa Romeo Quadrifoglio



**E22**

Test with universal test adapter  
Alfa Romeo Quadrifoglio



Trouble-shooting - test step 36 (continued)

- Adjust the exhaust using the idle-mixture-adjusting screw in the air-flow sensor.  
To do this, remove the plug in the air-flow sensor. After finishing the adjustment, use a new plug (red).

Turning the idle-mixture-adjusting screw in a clockwise direction:  
Increases the CO concentration.

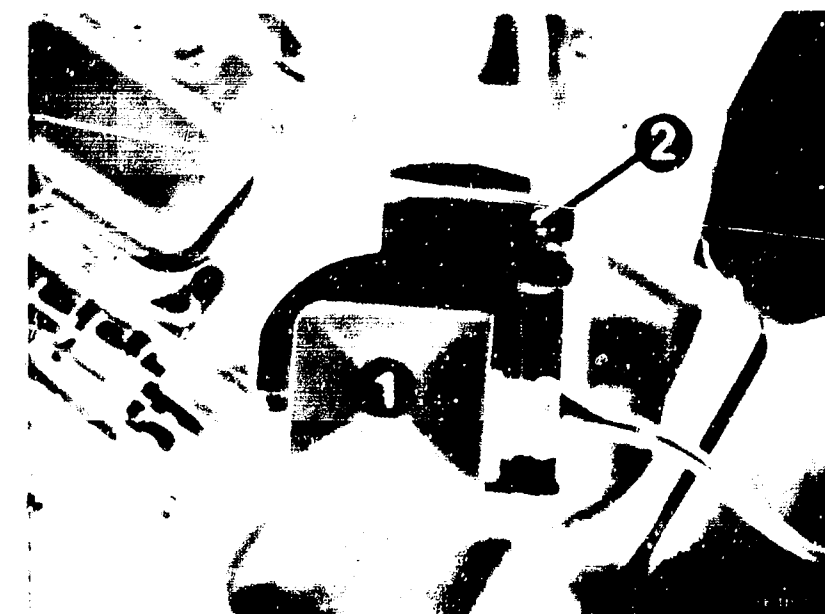
Turning the idle-mixture-adjusting screw in a counterclockwise direction:  
Reduces the CO concentration.

CO concentration less than 0.5 % by vol. CO and not adjustable:

Check the intake side and the exhaust system for leaks (unmetered air) by means of pressure test.

Concerning 2.

If the readings change after pressing button T2, the engine is not yet at normal operating temperature.



1 = Air-flow sensor with NTC 1  
2 = Idle-mixture-adjusting screw

**E23**

Test with universal test adapter

Alfa Romeo Quadrifoglio



**E24**

Test with universal test adapter

Alfa Romeo Quadrifoglio



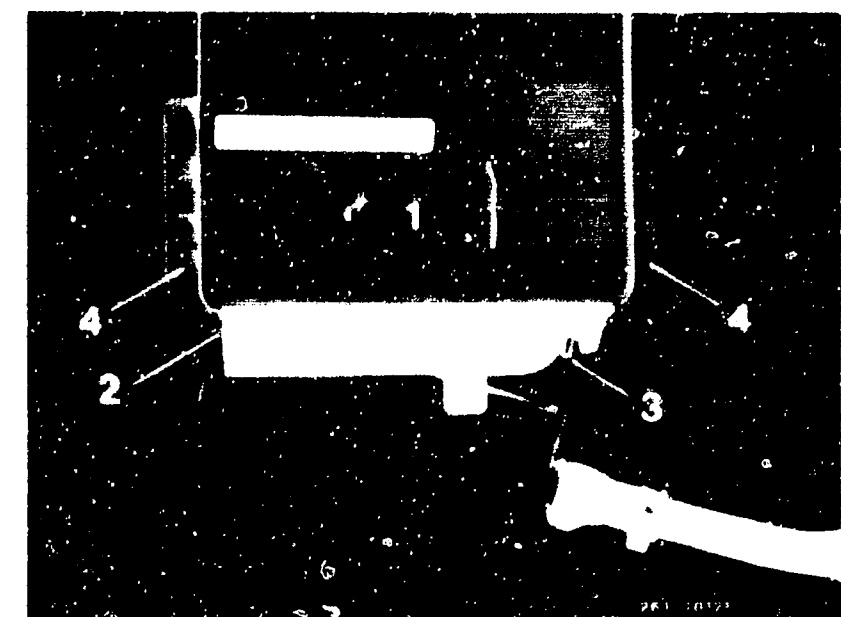
Test step 37			
Operation		Reading	Testing
Program switch "V" at position:	17	1. Spark advance with engine at operating temperature and at idle speed:  7°...13°	Component:  Control unit
Program switch "Q" at position:	15		
Measuring equipment: Motortester		Switzerland version:  -3°...+3°	Operation:  Spark advance at idle and at full load
Measuring range: Spark advance		2. Set engine speed to 3500 min <sup>-1</sup> and only then press button T6 (full load): For all vehicles: Spark advance 14°...24°	Malfunction:  Spark advance outside tolerance
Connection: Timing light			
Operation in vehicle: Allow engine to reach operating temperature.		If reading OK, continue testing with next test step.	

#### Trouble-shooting:

- Concerning 1. (above): Check idle speed accurately once again, and repeat test step. Idle speed must be between 800 ... 900 min<sup>-1</sup>, otherwise a different spark advance will be indicated.
- Concerning 2.: Bring engine up to stated engine speed once again and read off spark advance
- Replace control unit

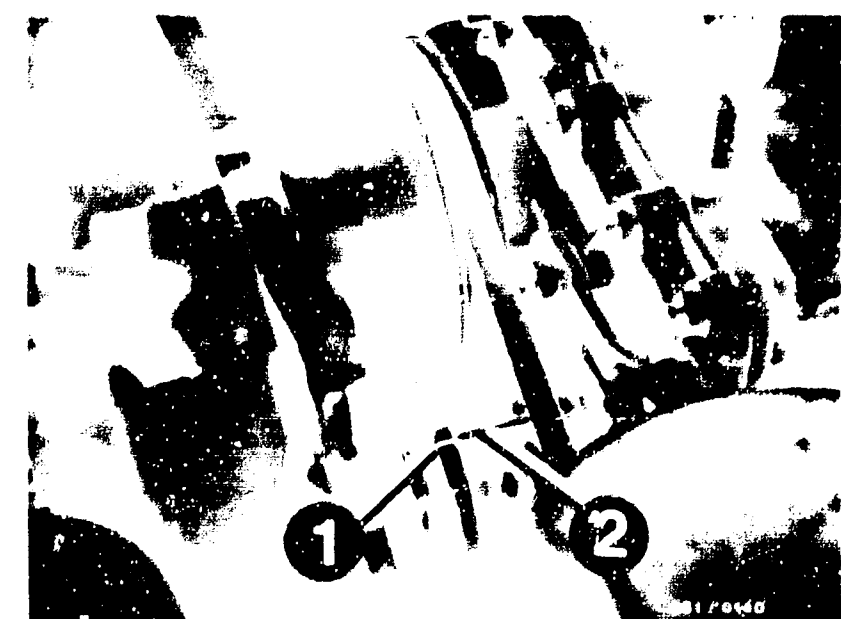
#### Note:

In order to rule out any confusion between the control units of the various systems, a mechanical locking device has been introduced. The "locating lug" (pivot point when opening and connecting the control unit) and the corresponding mounting point on the control unit have matching recesses and pins.



- 1 = Control unit
- 2 = Locating lug
- 3 = Detent
- 4 = Mounting holes

Moving ignition-timing mark "P" on V-belt pulley (1), corresponds to TDC. Pin (2) as fixed mark



**F1**

Test with universal test adapter  
Alfa Romeo Quadrifoglio

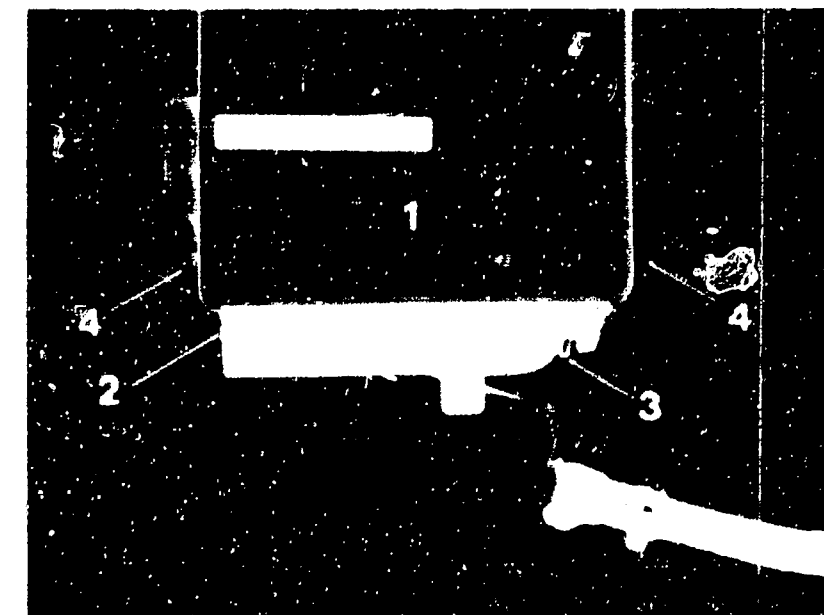


**F2**

Test with universal test adapter  
Alfa Romeo Quadrifoglio



Test step 38			
Operation		Reading	Testing
Program switch "V" at position:	17	1. With engine at normal operating temperature and at idle speed:  <u>8...15 °</u>  2. At 3000 min <sup>-1</sup>  <u>25...40°</u>  Note: Measure dwell angle at ignition coil.  If reading OK, continue testing with next test step.	<u>Component:</u>  Control unit
Program switch "2" at position:	15		
Measuring equipment: Motortester			<u>Operation:</u>  Dwell angle
Measuring range: Dwell angle			
Connection: Ignition coil			<u>Malfunction:</u>  Dwell angle outside tolerance
Operation in vehicle: Let engine run			



- 1 = Control unit
- 2 = Locating lug
- 3 = Detent
- 4 = Mounting holes

#### Trouble-shooting:

Replace control unit

#### Note:

In order to rule out any confusion between the control units of the various systems, a mechanical locking device has been introduced. The "locating lug" (pivot point when opening and connecting the control unit) and the corresponding mounting point on the control unit have matching recesses and pins.

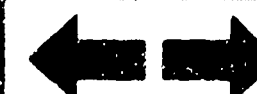
**F3**

Test with universal test adapter  
Alfa Romeo Quadrifoglio



**F4**

Test with universal test adapter  
Alfa Romeo Quadrifoglio





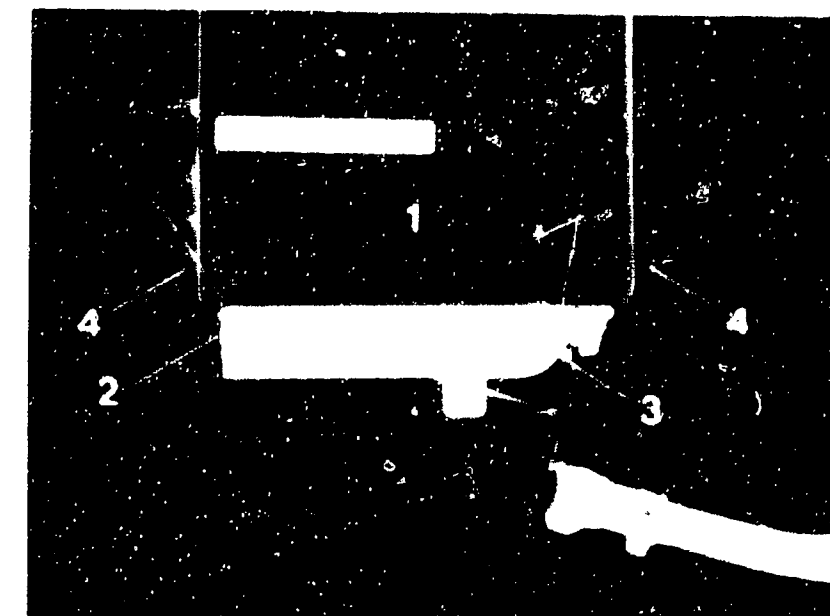
Test step 39			
Operation		Reading	Testing
Program switch "V" at position:	17	Engine at normal operating temperature Engine speed 2000 min <sup>-1</sup> (keep accelerator in same position). Press button T5:  <u>Engine "hunts"</u>  i.e. Engine speed drops to approx. 900 - 1200 min <sup>-1</sup> . Engine speed then rises again and drops again etc.  If reading OK, continue testing with next test step.	<u>Component:</u>  Control unit
Program switch "Ω" at position:	15		
Measuring equipment: Motortester			<u>Operation:</u>  Cutting off of injection pulses (overrun cutoff)
Measuring range: Engine speed			
Connection: Ignition coil			<u>Malfunction:</u>  No cutoff
Operation in vehicle: Let engine run			
Button: Press T5			

#### Trouble-shooting:

#### Replace control unit

#### Note:

In order to rule out any confusion between the control units of the various systems, a mechanical locking device has been introduced. The "locating lug" (pivot point when opening and connecting the control unit) and the corresponding mounting point on the control unit have matching recesses and pins.



- 1 = Control unit
- 2 = Locating lug
- 3 = Detent
- 4 = Mounting holes

**F5**

Test with universal test adapter  
Alfa Romeo Quadrifoglio



**F6**

Test with universal test adapter  
Alfa Romeo Quadrifoglio



TEST STEP 40:		
Operation		Reading
Program switch "V" at position:	17	1. Voltage at idle speed
Program switch " " at position:	15	10...15 V
Measuring equipment: Voltmeter		2. Set engine speed to 2000...3000 min <sup>-1</sup> and press button T6 (full load). Voltage:
Measuring range: 15 V		max. 4 V
Connection: Test sockets (red = +, black = ground)	V	3. At idle speed press button T6: <u>Engine runs rough or stops.</u>
Operation in vehicle: Ignition on. Operate engine at idle speed.		

#### Component:

1. Relay 3 (camshaft energization)

2. Control unit

3. Solenoid-operated valve

#### Operation:

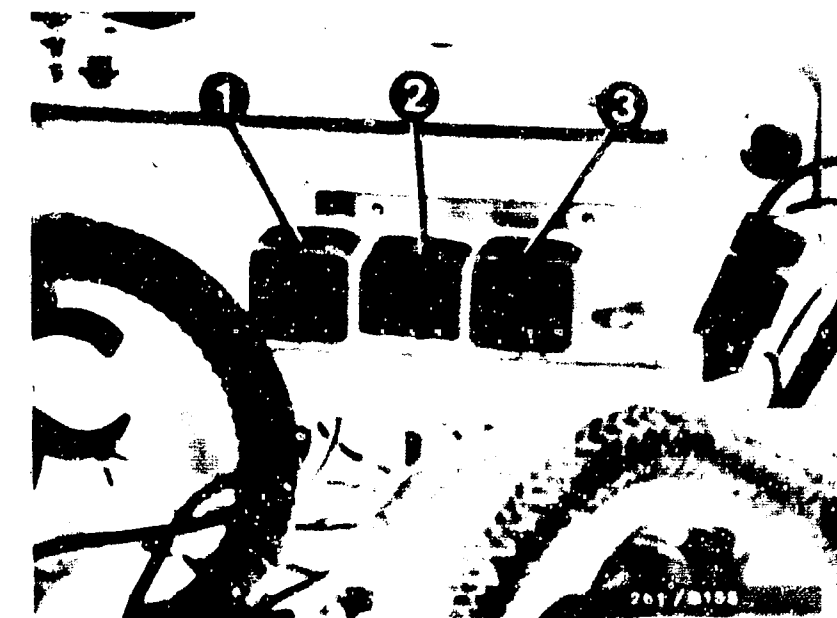
Voltage at term. 31 against ground

#### Malfunction:

1. Voltage less than 10 V

2. Voltage greater than 4 V

3. Idle speed unchanged.



- 1 = Relay 1 (pump relay)
- 2 = Relay 2 (main relay)
- 3 = Relay 3 (camshaft energization)

- 1 = Control unit
- 2 = Locating lug
- 3 = Detent
- 4 = Mounting holes

#### Trouble-shooting:

1. Replace relay 3.

Test lead from multiple plug term. 31 to relay 3 term. 85.

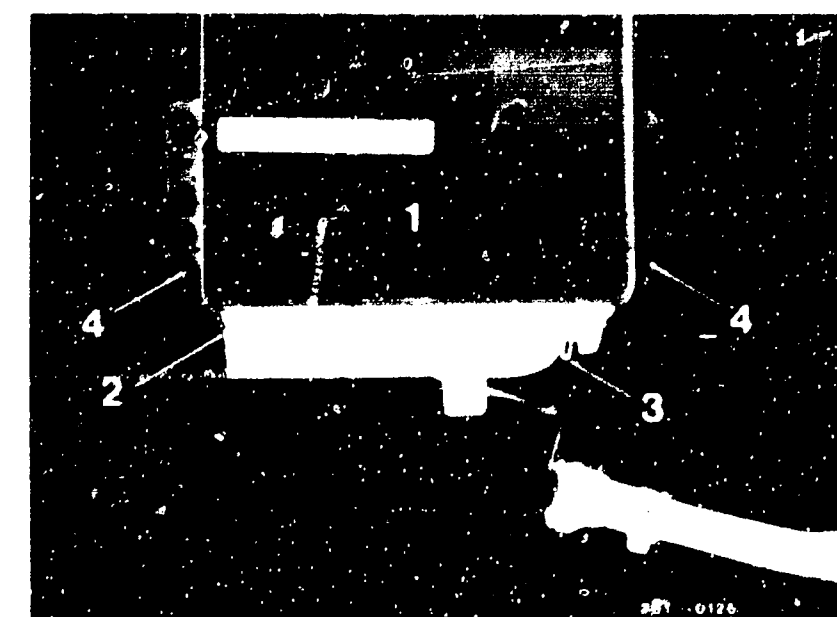
Test lead from relay 3 term. 86 to relay 1 (pump relay) term. 87.

2. Replace control unit.

#### Note:

In order to rule out any confusion between the control units of the various systems, a mechanical locking device has been introduced. The "locating lug" (pivot point when opening and connecting the control unit) and the corresponding mounting point on the control unit have matching recesses and pins.

3. Replace solenoid-operated valve for camshaft energization.



F7

Test with universal test adapter  
Alfa Romeo Quadrifoglio



F8

Test with universal test adapter  
Alfa Romeo Quadrifoglio



Testing with the Universal test adapter is now completed.  
If the fault has not been found or if you require  
further information and instructions on how to remedy  
the fault, continue with the trouble-shooting program  
of your choice.

Detailed trouble-shooting → see B3-B4  
Direct trouble-shooting → see B5-BT0

**F9**

Test with universal test adapter

Alfa Romeo Quadrifoglio



## 11. TROUBLE-SHOOTING PROGRAM ACCORDING TO CUSTOMER COMPLAINT

### How to use the following trouble-shooting program

The program is divided into 3 rows of boxes:

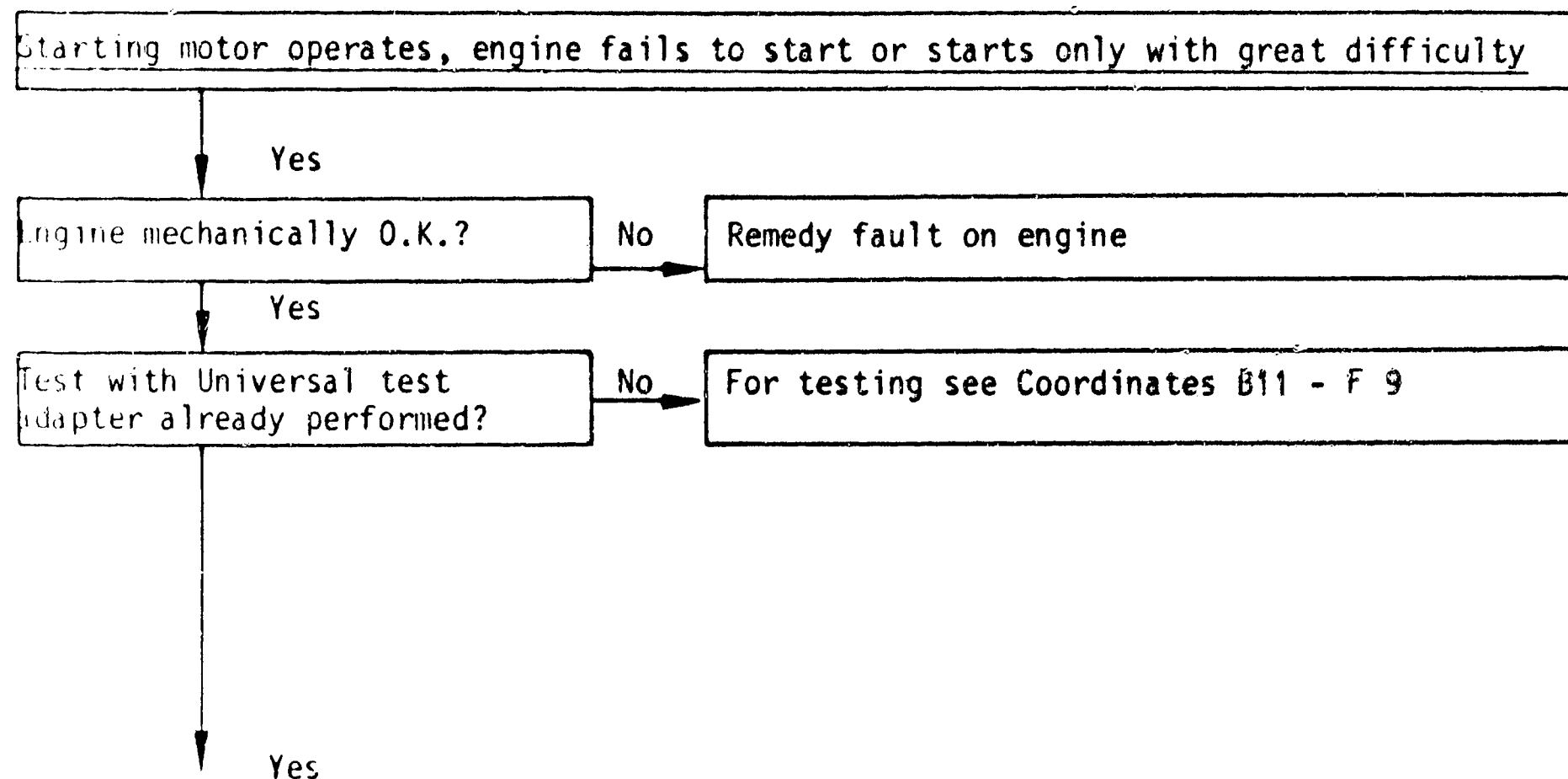
1. The left-hand row contains the questions on the tests.
2. The middle row contains descriptions of the testing and adjustment operations on the components.
3. The right-hand row contains the illustrations belonging to the text and explains the illustrations.

If the questions can be answered conclusively with "yes" without testing, proceed to the next question below.

If, on the other hand, the answer to the question is "no", and you suspect a fault, branch to the middle row of boxes and carry out the tests given there.

When you have finished testing continue trouble-shooting at the point at which you branched off.

#### START OF TROUBLE-SHOOTING



Continued on F 12/F 13

**F10**

Engine fails to start  
Alfa Romeo Quadrifoglio



**F11**

Engine fails to start  
Alfa Romeo Quadrifoglio



Starting motor operates, engine fails to start or starts only with great difficulty  
(continued)

Yes

Check secondary pattern of all cylinders at cranking speed. Secondary pattern O.K.?

No

Check ignition coil and high-voltage part. Check distributor cap for dirt and insulation damage.

Adjusting the high-voltage distributor:

Remove distributor cap. Set flywheel to TDC (P). Bring housing notch of high-voltage distributor into alignment with center of distributor rotor.

When connecting the H.T. ignition cables, note the cylinder numbers. Do not forget screening cover. Check ignition coil primary for continuity (approx.  $0\ \Omega$ ). Secondary resistance: 5 to 7.2 k $\Omega$ . Test interference-suppression resistors, ignition cables and spark plugs.

Interference-suppression resistor in

Distributor rotor:	1 k $\Omega$
Distributor outer dome:	1 k $\Omega$
Distributor center dome:	1 k $\Omega$
Spark-plug connector:	5 k $\Omega$
Ignition coil:	0 k $\Omega$

Yes

While cranking, feel all injection valves by hand. Can needle movement be felt on all valves?

No

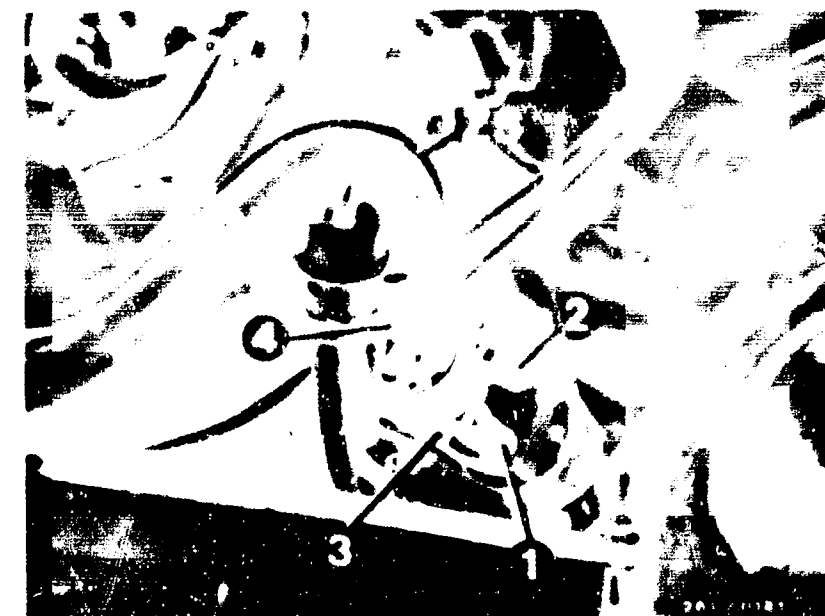
Test injection valve with ohmmeter.

Test specification: 2 to 3  $\Omega$

Replace injection valve if defective.

Yes

Continued on F 14/F 15



High-voltage distributor

1 to 4 = Cylinder numbers

ZS = High-tension cable to ignition coil

F12

Engine fails to start

Alfa Romeo Quadrifoglio

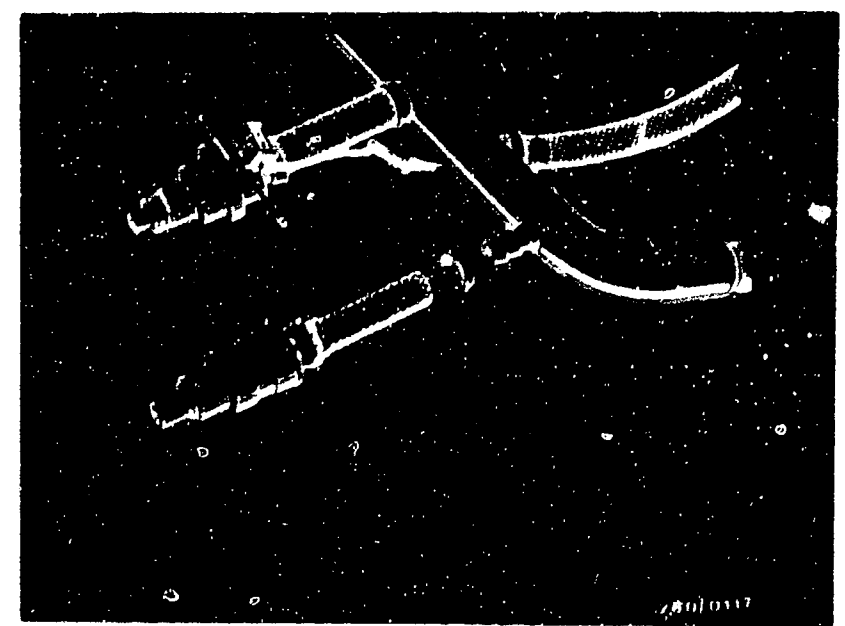
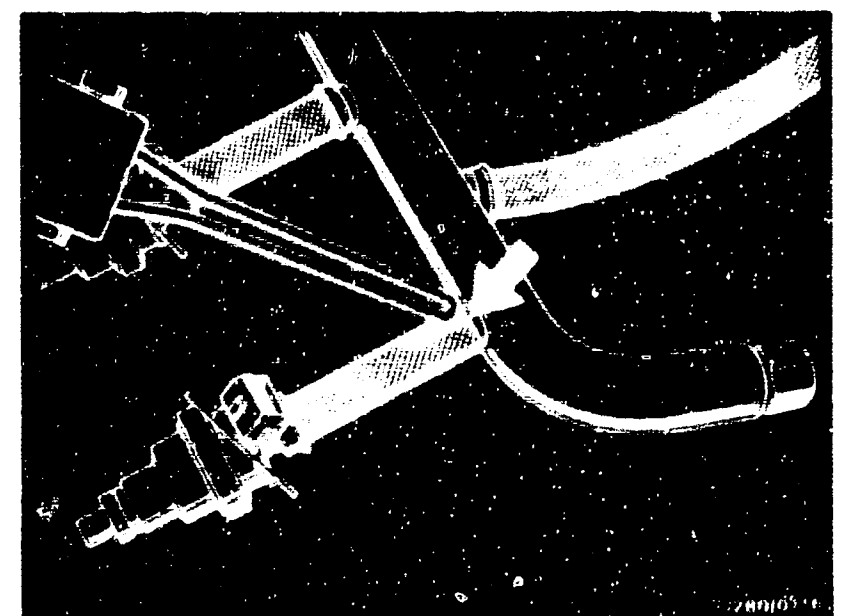
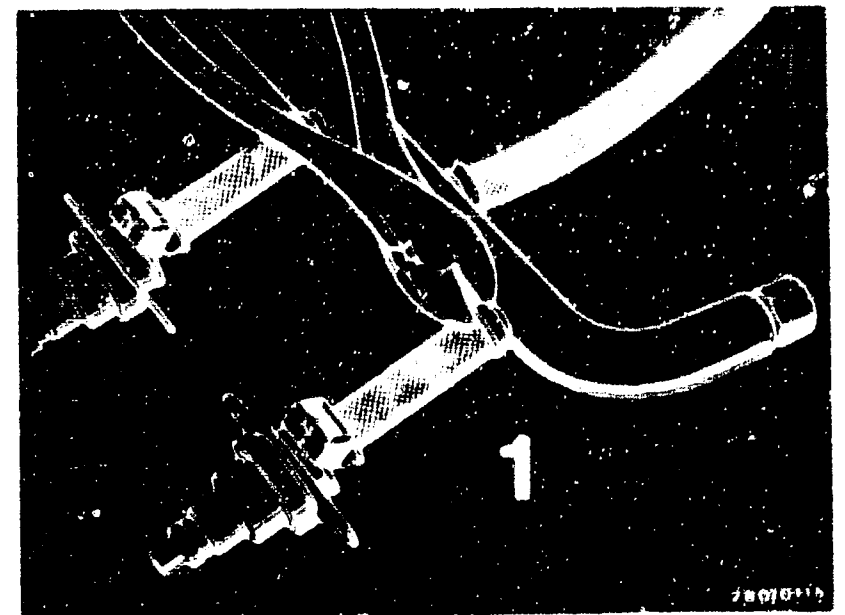
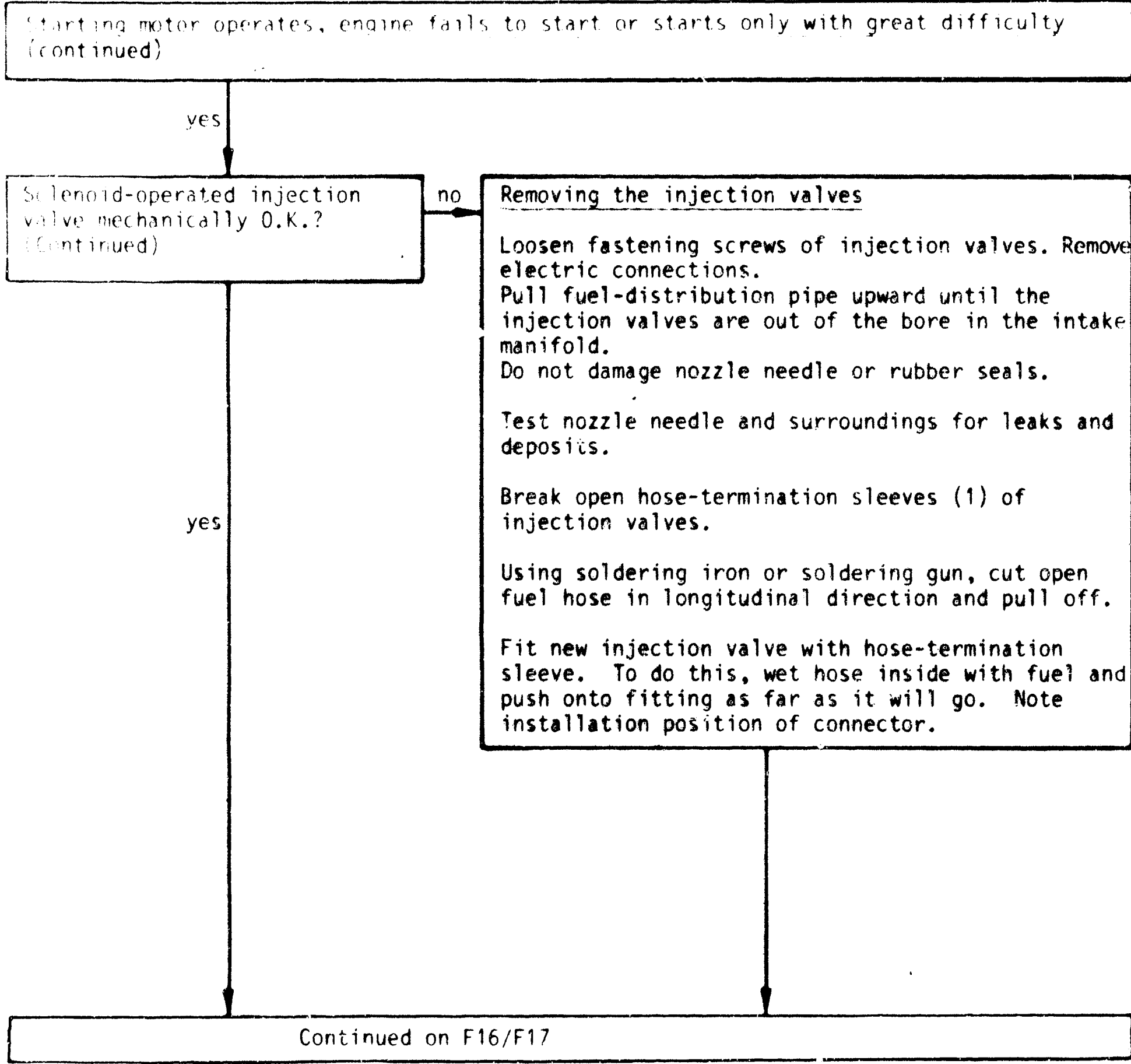


F13

Engine fails to start

Alfa Romeo Quadrifoglio





Starting motor operates, engine fails to start or starts only with great difficulty  
(continued)

Yes

#### 1. Removing the hose

- The fasteners on the injection valve (O-ring) need not be removed.
- Place injection valve (2) in clamping fixture 1 688 120 093 (1) and clamp in vise.
- Cut open hose-termination sleeve with side cutters and remove.
- Cut open the hose lengthways using a soldering iron or soldering gun and pull off.

#### 2. Installing the hose

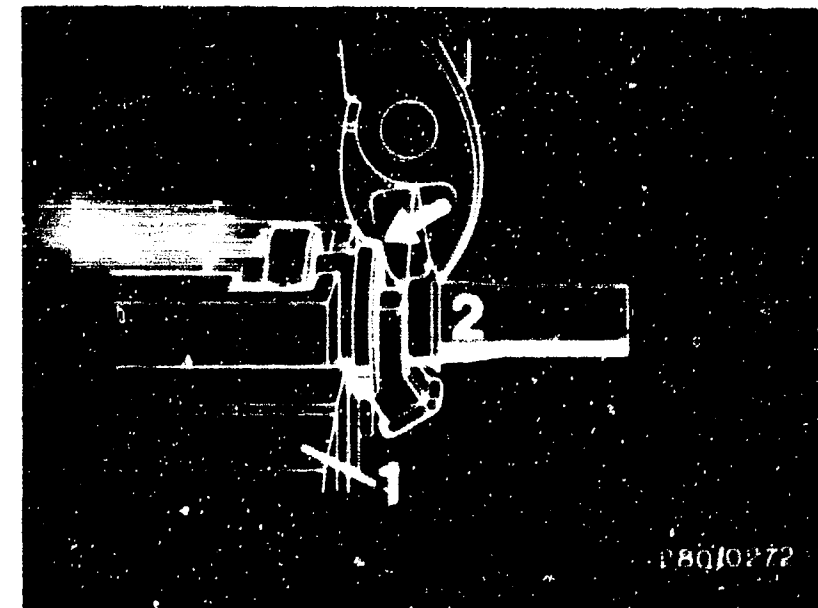
Parts set 1 287 010 701 is required for installation.

- Clean outside of tailpiece.
  - Wet new fuel hose with fuel or calibrating oil.
  - Press hose and hose-termination sleeve by hand as far as they will go onto the tailpiece using assembly mandrel 1 687 931 003 (3).
- Hose-termination sleeve must then be tight.

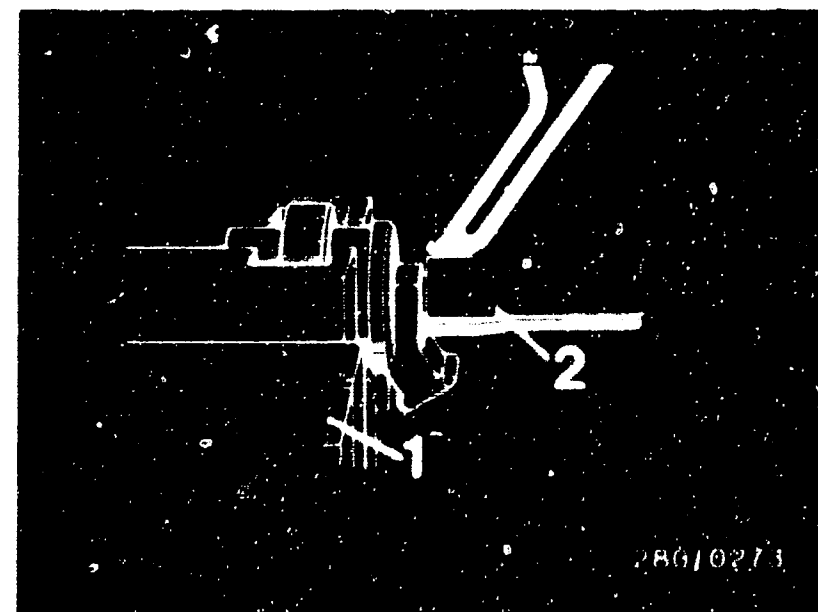
**Caution!** Do not use hose clamp on tailpiece of injection valve.

#### Installing the injection valves

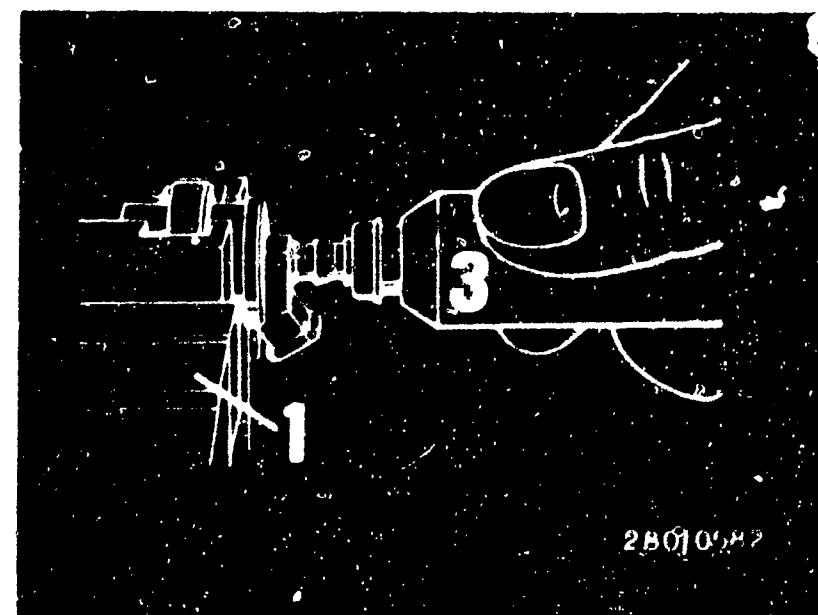
Make sure that the two rubber seals are properly seated on each injection valve. Replace defective seals. Press all 4 injection valves with the fuel-delivery line uniformly into the seats and secure. Make sure there are no air leaks. Plug on electrical connections and air hoses.



28010272



28010273



28010274

Continued on F 18/F 19

**F16**

Engine fails to start  
Alfa Romeo Quadrifoglio



**F17**

Engine fails to start  
Alfa Romeo Quadrifoglio



Starting motor operates, engine fails to start or starts only with great difficulty  
(continued)

Yes

Auxiliary-air device tested?

No

Testing (mechanical):

1. Visual examination of auxiliary-air device:

Remove hoses and look down, using a small mirror. When cold, the device must be open; when the engine is warm, it must be closed. If not, replace auxiliary-air device.

2. Functional test of auxiliary-air device:

With the engine cold, pinch off hose to auxiliary-air device. Engine speed must drop. With the engine warm, pinch off hose to auxiliary-air device. Engine speed must not drop. If incorrect, replace auxiliary-air device (pay attention to direction of flow).

3. Electrical test

Remove plug from auxiliary-air device. Connect ohmmeter to both terminals of the auxiliary-air device.

Test values:                      25 ... 60  $\Omega$

If a value outside the tolerance is shown, replace the auxiliary-air device.

Yes

Continued on F 20/F 21



- 1 = Auxiliary-air device
- 2 = Throttle-valve switch
- 3 = Idle-speed adjusting screw

**F18**

Engine fails to start  
Alfa Romeo Quadrifoglio



**F19**

Engine fails to start  
Alfa Romeo Quadrifoglio





starting motor operates, engine fails to start or starts only with great difficulty  
(continued)

Yes

Air-flow sensor mechanically  
OK?

No

Testing: Open air-flow sensor flap by hand. It must be possible to open the air-flow sensor flap with uniform ease from its fully closed position to its fully open position. When released, the flap must close completely by itself. When the air-flow sensor flap is opened it must not catch at any point. Watch for any indications of abrasion or rubbing. Clean air-flow sensor if the inside is very dirty and rub out with a lint-free cloth. If there are any signs of abrasion or rubbing, replace the air-flow sensor.

Yes

Are all hose lines and electric  
leads securely attached?  
Visual examination.  
Is the air-intake system leak-  
tight?

No

Check whether hoses of air-intake system and of fuel line system are securely attached, not kinked or damaged. If necessary, replace hoses. Eliminate leaks with new seals or by re-tightening the connecting screws.  
Leak test: Seal off exhaust tail pipe. Open air filter and seal off air-flow sensor duct. Remove hose after auxiliary-air device and blow air (0.3 bar gauge pressure) into intake manifold with compressed-air gun. Seal off auxiliary-air device connection port.  
Open throttle valve fully when doing this. Brush or spray all joints with soapy water. Bubbling or foaming indicates a leak.  
Check electrical plug-in contacts for loose contact. Spring contacts in the connectors must not allow themselves to be pushed back.

Yes

Continued on F22/F23



1 = Air-flow sensor with NTC I  
2 = Idle-mixture-adjusting screw

Arrows = Ground lead



F20

Engine fails to start  
Alfa Romeo Quadrifoglio



F21

Engine fails to start  
Alfa Romeo Quadrifoglio



Starting motor operates, engine fails to start or starts only with great difficulty  
(continued)

Yes

Testing completed for customer complaint

"Starting motor operates, engine fails to start or starts only with great difficulty".

Customer complaint remedied?

No

Further possibilities

- Customer complaint incorrectly diagnosed (see Coordinates B3...B10). If the fault has not be detected by "direct trouble-shooting", see "detailed trouble-shooting" (Coordinates B3/B4).
- Engine not mechanically O.K. (Compression, valve setting, valve timing, worn camshaft).

**F22**

Engine fails to start  
Alfa Romeo Quadrifoglio



**F23**

Engine fails to start  
Alfa Romeo Quadrifoglio



## Trouble-shooting program according to customer complaints

### How to use the following trouble-shooting program

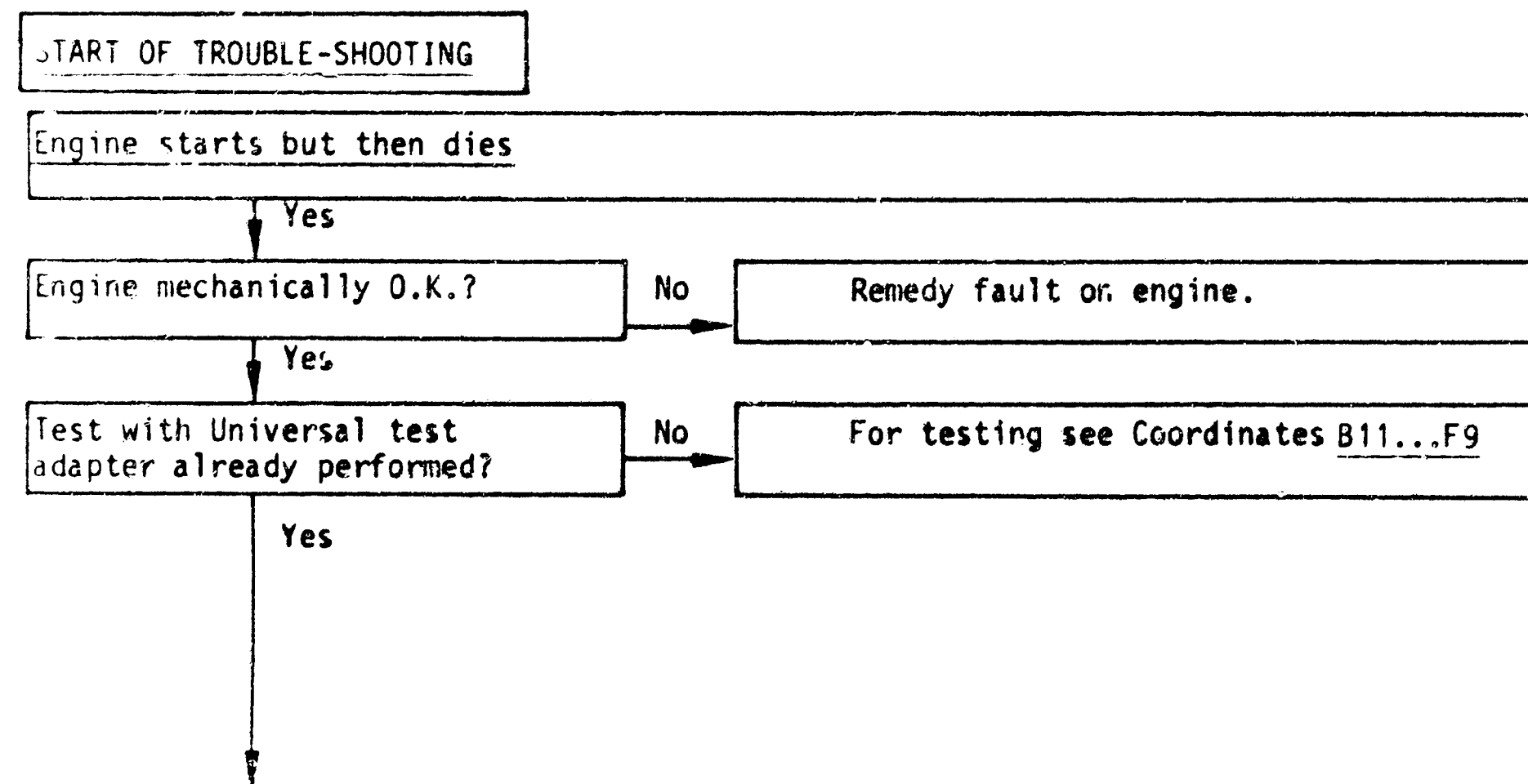
The program is divided into 3 rows of boxes:

1. The left-hand row contains the questions on the tests.
2. The middle row contains descriptions of the testing and adjustment operations on the components.
3. The right-hand row contains the illustrations belonging to the text and explains the illustrations.

If the questions can be answered conclusively with "yes" without testing, proceed to the next question below.

If, on the other hand, the answer to the question is "no", and you suspect a fault, branch to the middle row of boxes and carry out the tests given there.

When you have finished testing continued trouble-shooting at the point at which you branched off.



Continued on G3/G4

**G1**

Engine starts but then dies

Aut. Romeo Quadrifoglio



**G2**

Engine starts but then dies

Alfa Romeo Quadrifoglio



Engine starts but then dies (continued)

Yes

Are all hose lines and electric leads securely attached?  
Visual examination.  
Is the air-intake system leak-tight?

No

Check whether hoses of air-intake system and of fuel line system are securely attached, not kinked or damaged. If necessary, replace hoses. Eliminate leaks with new seals or by re-tightening the connecting screws.

Leak test: Seal off exhaust tail pipe. Open air filter and seal off air-flow sensor duct. Remove hose after auxiliary-air device and blow air (0.3 bar gauge pressure) into intake manifold with compressed-air gun. Seal off auxiliary-air device connection port.

Open throttle valve fully when doing this. Brush or spray all joints with soapy water. Bubbling or foaming indicates a leak.

Check electrical plug-in contacts for loose contact. Spring contacts in the connectors must not allow themselves to be pushed back.

Yes

Continued on G5/G6

**G3**

Engine starts but then dies  
Alfa Romeo Quadrifoglio



**G4**

Engine starts but then dies  
Alfa Romeo Quadrifoglio



Engine starts but then dies (continued)

Yes

Auxiliary-air device  
tested?

No

Testing (mechanical):

1. Visual examination of auxiliary-air device  
Remove hoses and look down, using a small mirror.  
When cold, the device must be open; when the  
engine is warm, it must be closed. If not,  
replace auxiliary-air device.

2. Functional test of auxiliary-air device  
When engine is cold, disconnect hose to auxiliary-  
air device. Engine speed must drop.  
When engine is warm, disconnect hose to auxiliary-  
air device. Engine speed must not drop.  
If not replace auxiliary-air device (observe  
direction of flow).

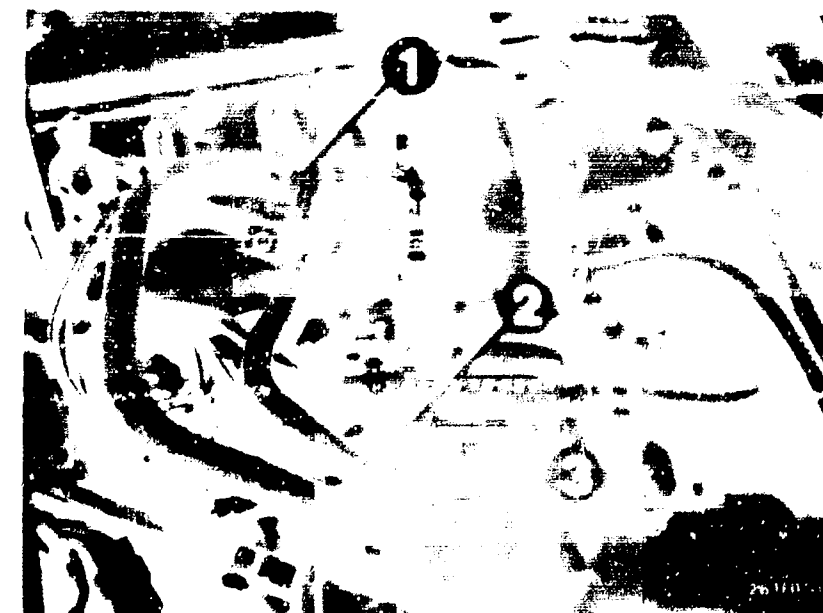
3. Electrical test  
Disconnect plug of auxiliary-air device.  
Connect ohmmeter to both terminals of the  
auxiliary-air device.

Test values: 25 ... 60  $\Omega$

If a value outside tolerance is shown, replace  
auxiliary-air device.

Yes

Continued on G7/G8



- 1 = Auxiliary-air device
- 2 = Throttle-valve switch
- 3 = Idle-speed adjusting screw

**G5**

Engine starts but then dies  
Alfa Romeo Quadrifoglio



**G6**

Engine starts but then dies  
Alfa Romeo Quadrifoglio



Engine starts but then dies (continued)

Yes

Start valve O.K.?  
(Continued)

No

Testing: Open air-flow sensor flap by hand. It must be possible to open the air-flow sensor flap with uniform ease from its fully closed position to its fully open position. When released, the flap must close completely by itself. When the air-flow sensor flap is opened it must not catch at any point. Watch for any indications of abrasion or rubbing. Clean air-flow sensor if the inside is very dirty and rub out with a lint-free cloth. If there are any signs of abrasion or rubbing, replace the air-flow sensor.

Yes

Testing completed for  
customer complaint

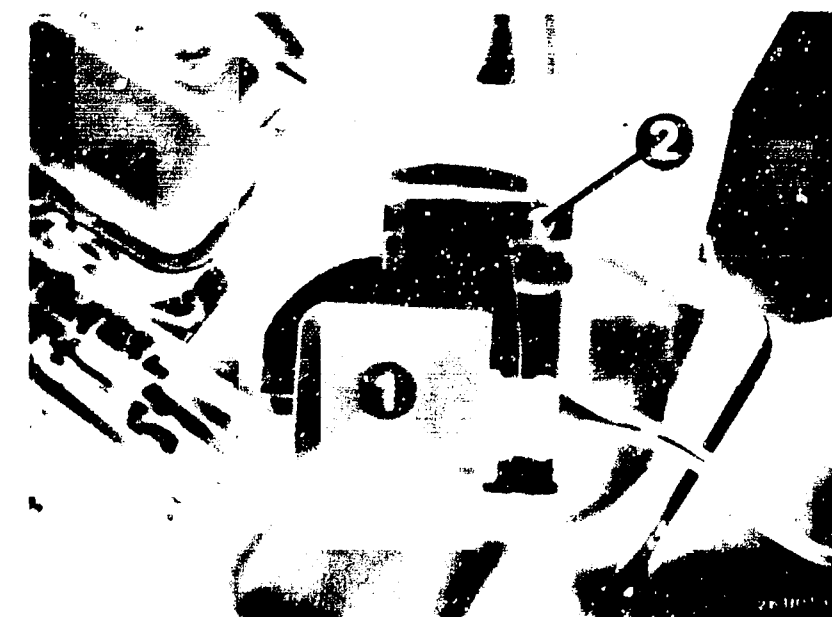
"Engine starts but then  
dies".

Customer complaint  
remedied?

No

Further possibilities:

- Customer complaint incorrectly diagnosed (see Coordinates B3...B10).  
If the fault has not been detected by "direct trouble-shooting", see "detailed trouble-shooting" (Coordinates B3/B4).
- Engine not mechanically O.K. (Compression, valve setting, valve timing, worn camshaft).



1 = Air-flow sensor with NTC 1  
2 = Idle-mixture-adjusting  
screw

**G7**

Engine starts but then dies  
Alfa Romeo Quadrifoglio



**G8**

Engine starts but then dies  
Alfa Romeo Quadrifoglio



## Trouble-shooting program according to customer complaints

### How to use the following trouble-shooting program

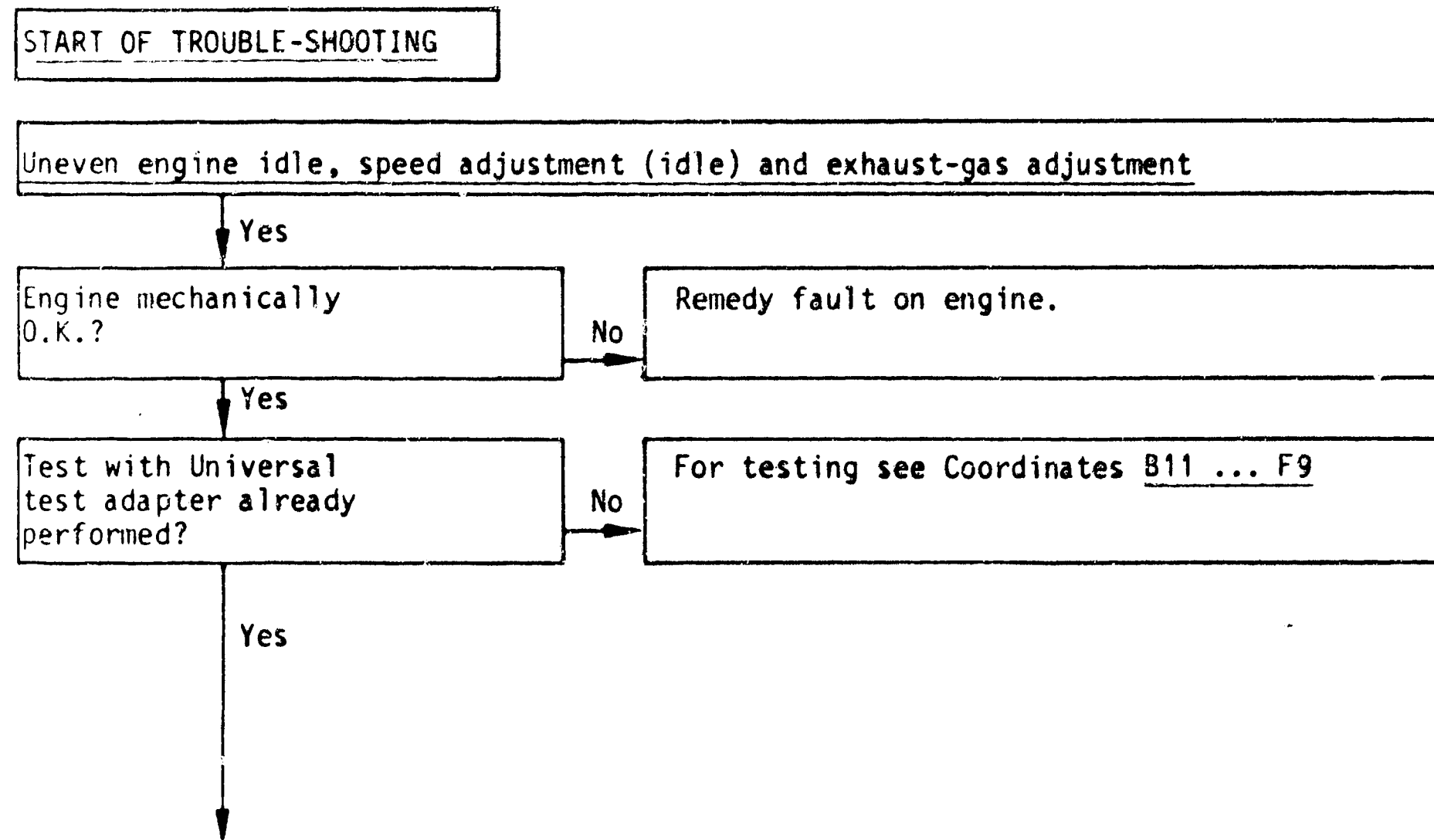
The program is divided into 3 rows of boxes:

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If the questions can be answered conclusively with "yes" without testing, proceed to the next question below.

If, on the other hand, the answer to the question is "no", and you suspect a fault, branch to the middle row of boxes and carry out the tests given there.

When you have finished testing continue trouble-shooting at the point at which you branched off.



Continued on G11/G12

**G9**

Uneven engine idle  
Alfa Romeo Quadrifoglio



**G10**

Uneven engine idle  
Alfa Romeo Quadrifoglio



Uneven engine idle, speed adjustment (idle) and exhaust-gas adjustment  
(continued)

Yes

Check secondary pattern of all cylinders at cranking speed. Secondary pattern O.K.?

No

Check ignition coil and high-voltage part. Check distributor cap for dirt and insulation damage.

Adjusting the high-voltage distributor:

Remove distributor cap. Set flywheel to TDC (P). Bring housing notch of high-voltage distributor into alignment with center of distributor rotor.

When connecting the H.T. ignition cables, note the cylinder numbers. Do not forget screening cover. Check ignition coil primary for continuity (approx 0  $\Omega$ ). Secondary resistance: 5 to 7.2 k $\Omega$ . Test interference-suppression resistors, ignition cables and spark plugs.

Interference-suppression resistor in

Distributor rotor:	1 k $\Omega$
Distributor outer dome:	1 k $\Omega$
Distributor center dome:	1 k $\Omega$
Spark-plug connector:	5 k $\Omega$
Ignition coil:	0 k $\Omega$

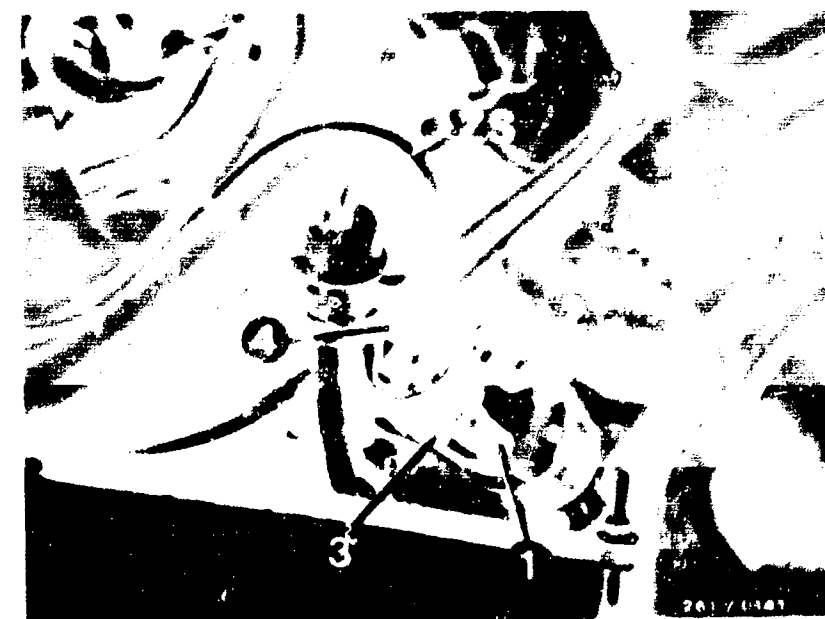
Yes

Air-flow sensor O.K.?

No

Testing: Open air-flow sensor flap by hand. It must be possible to open the air-flow sensor flap with uniform ease from its fully closed position to its fully open position. When released, the flap must close completely by itself. When the air-flow sensor flap is opened it must not catch at any point. Watch for any indications of abrasion or rubbing. Clean air-flow sensor if the inside is very dirty and rub out with a lint-free cloth. If there are any signs of abrasion or rubbing, replace the air-flow sensor.

Continued on G13/G14

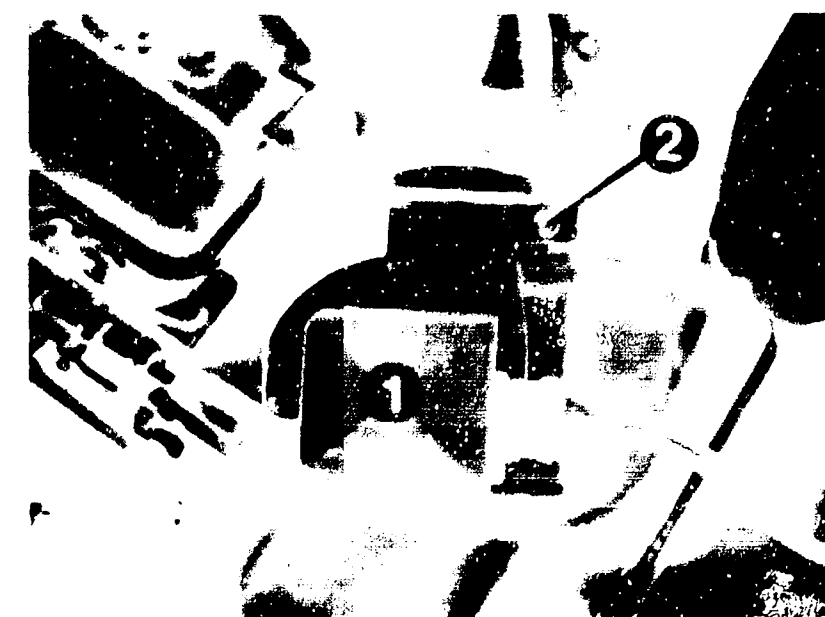


High-voltage distributor

1 to 4 = Cylinder numbers

ZS = High-tension cable to ignition coil

1 = Air-flow sensor with NTC I  
2 = Idle-mixture-adjusting screw



**G11**

Uneven engine idle

Alfa Romeo Quadrifoglio



**G12**

Uneven engine idle

Alfa Romeo Quadrifoglio





Uneven engine idle, speed adjustment (idle) and exhaust-gas adjustment (continued)

Yes

Are all hose lines and electric leads securely attached?  
Visual examination.  
Is the air-intake system leak-tight?

No

Check whether hoses of air-intake system and of fuel line system are securely attached, not kinked or damaged. If necessary, replace hoses. Eliminate leaks with new seals or by re-tightening the connecting screws.

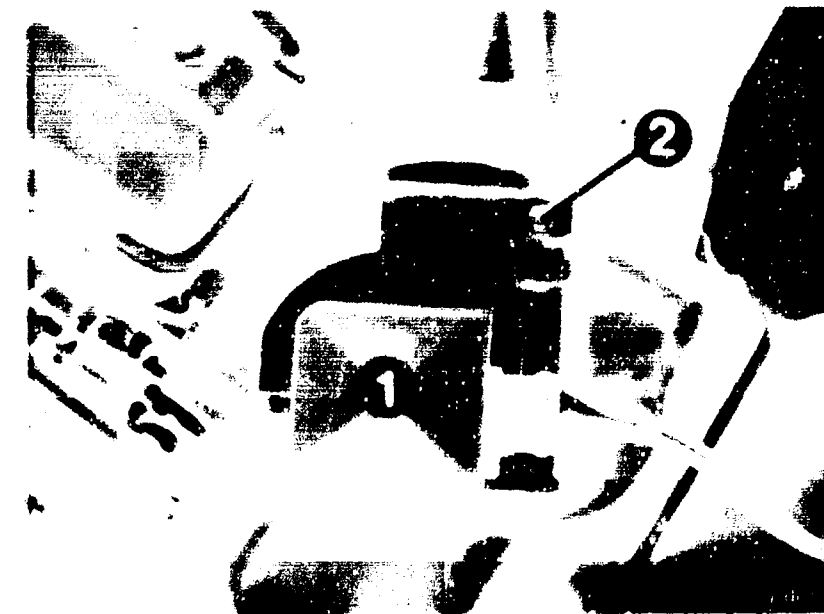
**Leak test:** Seal off exhaust tail pipe. Open air filter and seal off air-flow sensor duct. Remove hose after auxiliary-air device and blow air (0.3 bar gauge pressure) into intake manifold with compressed-air gun. Seal off auxiliary-air device connection port.

Open throttle valve fully when doing this. Brush or spray all joints with soapy water. Bubbling or foaming indicates a leak.

Check electrical plug-in contacts for loose contact. Spring contacts in the connectors must not allow themselves to be pushed back.

Yes

Continued on G15/G16



- 1 = Air-flow sensor with NTC 1
- 2 = Idle-mixture-adjusting screw

**G13**

Uneven engine idle

Alfa Romeo Quadrifoglio



**G14**

Uneven engine idle

Alfa Romeo Quadrifoglio



Uneven engine idle, speed adjustment (idle) and exhaust-gas adjustment (continued)

Yes

Auxiliary-air device  
tested?

No

Yes

Testing (mechanical):

1. Visual examination of auxiliary-air device:  
Remove hoses and look down, using a small mirror.  
When cold, the device must be open when the  
engine is warm, it must be closed. If not,  
replace auxiliary-air device.

2. Functional test of auxiliary-air device:  
With the engine cold, pinch off hose to  
auxiliary-air device. Engine speed must drop.  
With the engine warm, pinch off hose to  
auxiliary-air device. Engine speed must not drop.  
If incorrect, replace auxiliary-air device (pay  
attention to direction of flow).

3. Electrical test

Disconnect plug of auxiliary-air device. Connect  
ohmmeter to both terminals of the auxiliary-air  
device.

Test values: 25 ... 60  $\Omega$

If a value outside the tolerance is shown, replace  
the auxiliary-air device.



- 1 = Auxiliary-air device
- 2 = Throttle-valve switch
- 3 = Idle-speed adjusting screw

Continued on G 17/G18

**G 15**

Uneven engine idle  
Alfa Romeo Quadrifoglio



**G 16**

Uneven engine idle  
Alfa Romeo Quadrifoglio



Uneven engine idle, speed adjustment (idle) and exhaust-gas adjustment (continued)

yes

Solenoid-operated injection valve mechanically O.K.?

no

With the engine running, disconnect injection-valve connectors individually, one after the other, from injection valves and plug on again. Engine speed must drop if injection valve O.K.. If not, replace injection valve.

Removing the injection valves

Loosen fastening screws of injection valves. Remove electric connections.

Pull fuel-distribution pipe upward until the injection valves are out of the bore in the intake manifold.

Do not damage nozzle needle or rubber seals.

Test nozzle needle and surroundings for leaks and deposits.

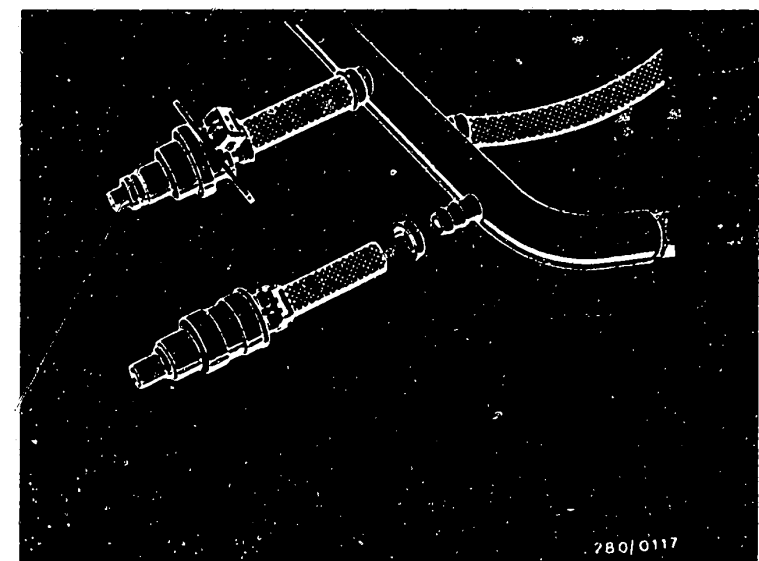
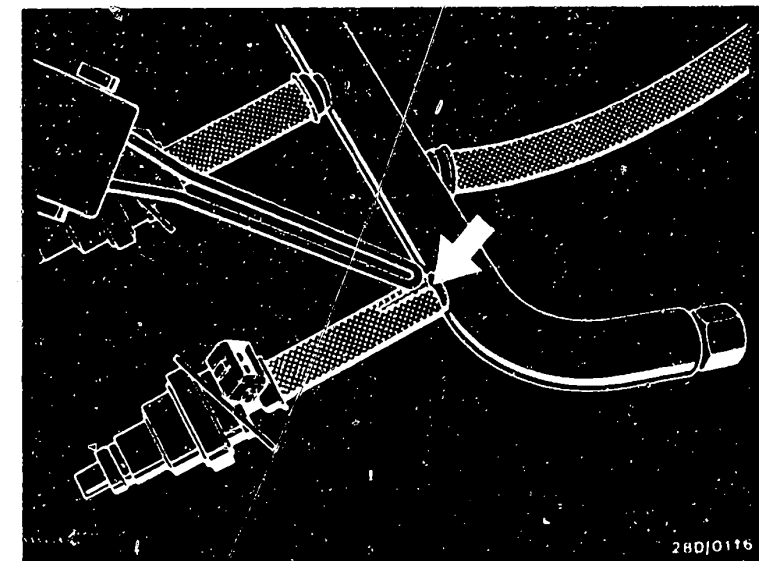
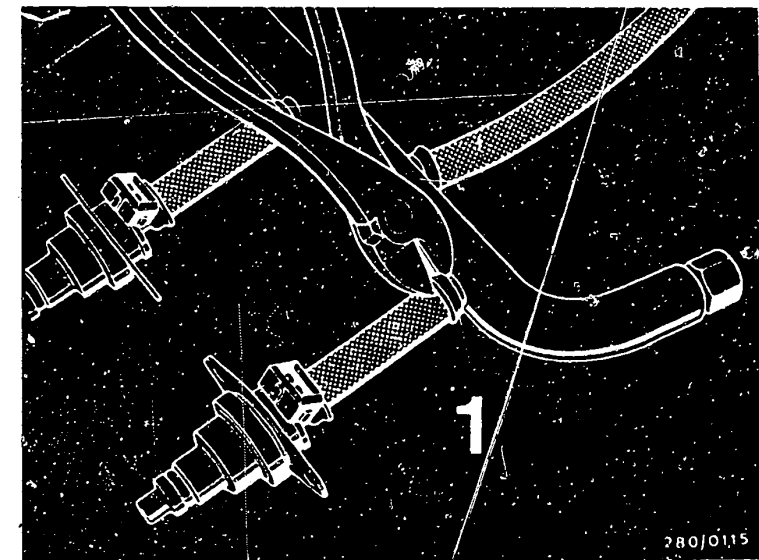
Break open hose-termination sleeves (1) of injection valves.

Using soldering iron or soldering gun, cut open fuel hose in longitudinal direction and pull off.

Fit new injection valve with hose-termination sleeve. To do this, wet hose inside with fuel and push onto fitting as far as it will go. Note installation position of connector.

yes

Continued on G19/G20



**G17**

Uneven engine idle  
Alfa Romeo Quadrifoglio



**G18**

Uneven engine idle  
Alfa Romeo Quadrifoglio



Yes

Continued on G21/G22

### 1. Removing the hose

- The fasteners on the injection valve (O-ring) need not be removed.
- Place injection valve (2) in clamping fixture 1 688 120 093 (1) and clamp in vise.
- Cut open hose-termination sleeve with side cutters and remove.
- Cut open the hose lengthways using a soldering iron or soldering gun and pull off.

### 2. Installing the hose

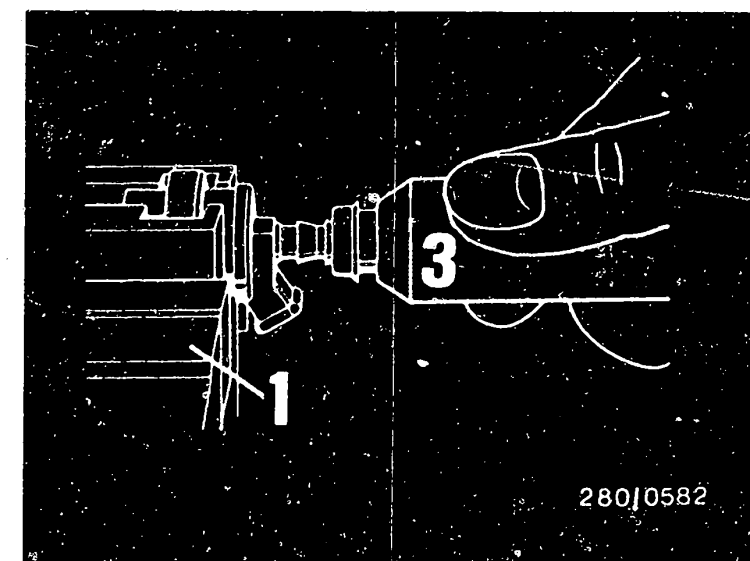
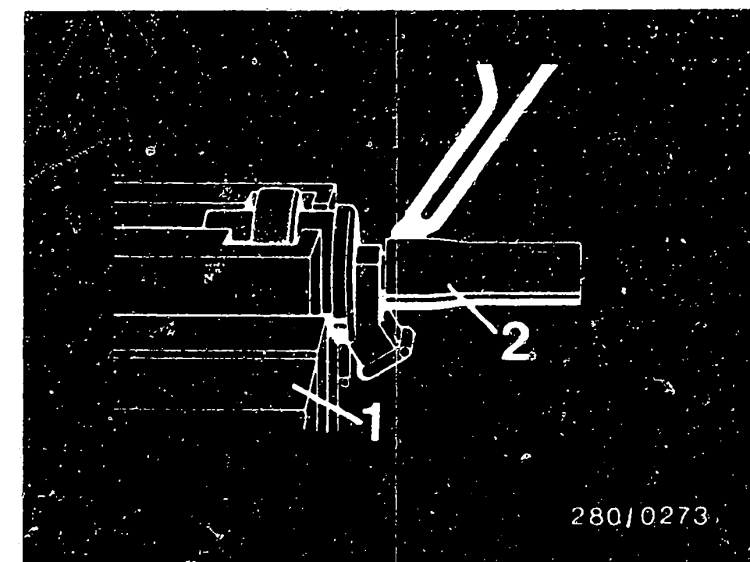
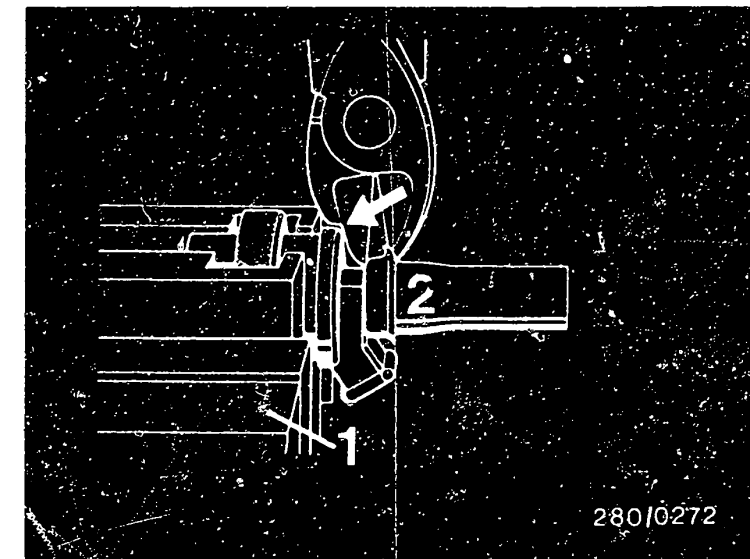
Parts set 1 287 010 701 is required for installation.

- Clean outside of tailpiece.
- Wet new fuel hose with fuel or calibrating oil.
- Press hose and hose-termination sleeve by hand as far as they will go onto the tailpiece using assembly mandrel 1 687 931 003 (3).  
Hose-termination sleeve must then be tight.

**Caution!** Do not use hose clamp on tailpiece of injection valve.

### Installing the injection valves

Make sure that the two rubber seals are properly seated on each injection valve. Replace defective seals. Press all 4 injection valves with the fuel-delivery line uniformly into the seats and secure. Make sure there are no air leaks. Plug on electrical connections and air hoses.



# Uneven engine idle, speed adjustment (idle) and exhaust-gas test (continued)

Yes

With engine at normal operating temperature, set idle speed with idle screw to  
 $800 \dots 900 \text{ min}^{-1}$

With engine at normal operating temperature, set CO adjusting screw to  
 $0.5 \dots 1.5 \text{ \% by vol. CO}$

Yes

Testing completed for customer complaint

"Uneven engine idle".

Customer complaint remedied?

No

- Set idle speed at idle adjustment screw in throttle-valve fitting.
- Set exhaust gas with mixture-adjustment screw in air-flow sensor. To do this remove the plug.

If CO cannot be adjusted:

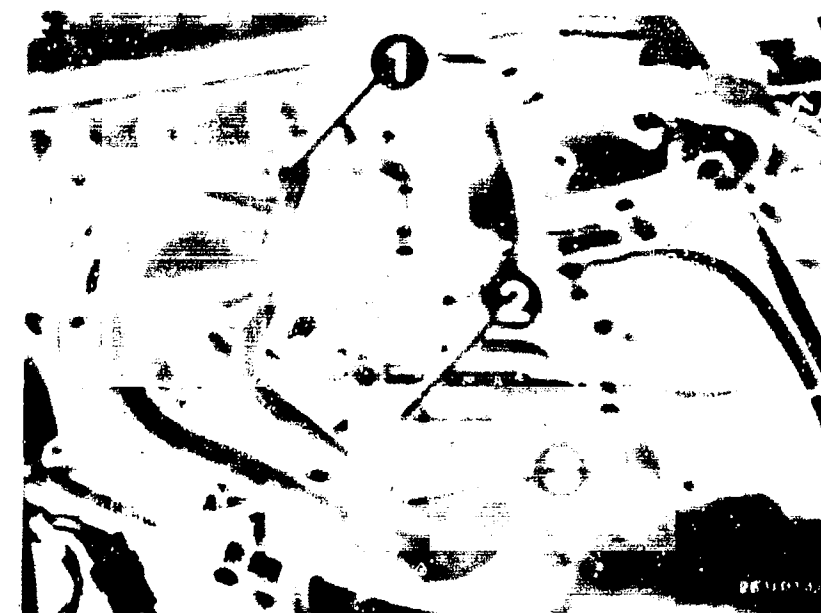
- CO concentration too low: Repeat leak test on air-intake system.
- CO concentration too high: Replace air-flow sensor.

Note: Use new plug (red) in air-flow sensor after CO adjustment.

No

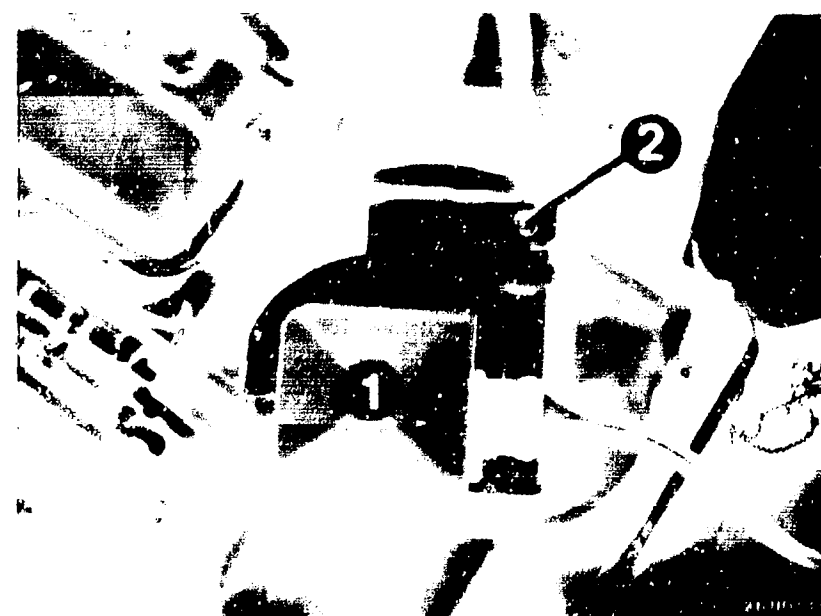
Further possibilities:

- Customer complaint incorrectly diagnosed (see Coordinates B3...B10).  
 If the fault has not been detected by "direct trouble-shooting", see "detailed trouble shooting" (Coordinates B3/B4)
- Engine not mechanically O.K. (compression, valve setting, valve timing, worn camshaft).



1 = Auxiliary-air device  
 2 = Throttle-valve switch  
 3 = Idle-speed adjusting screw

1 = Air-flow sensor with NTC  
 2 = Idle-mixture-adjusting screw



G21

Uneven engine idle  
 Alfa Romeo Quadrifoglio



G22

Uneven engine idle  
 Alfa Romeo Quadrifoglio



## Trouble-shooting program according to customer complaints

### How to use the following trouble-shooting program

The program is divided into 3 rows of boxes:

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When you have finished testing continue trouble-shooting at the point at which you branched off.

#### START OF TROUBLE-SHOOTING

Poor throttle take-up

Yes

Engine mechanically  
O.K.?

No

Remedy fault on engine.

Yes

Test with Universal test  
adapter already

No

For testing see Coordinates B11 ... F9

Yes

Continued on H2 H1

H1

Poor throttle take-up  
Alfa Romeo Quadrifoglio



H2

Poor throttle take-up  
Alfa Romeo Quadrifoglio



### Poor throttle take-up (continued)

Yes

Check secondary pattern of all cylinders at cranking speed. Secondary pattern O.K.?

No

Yes

Check ignition coil and high-voltage part. Check distributor cap for dirt and insulation damage.

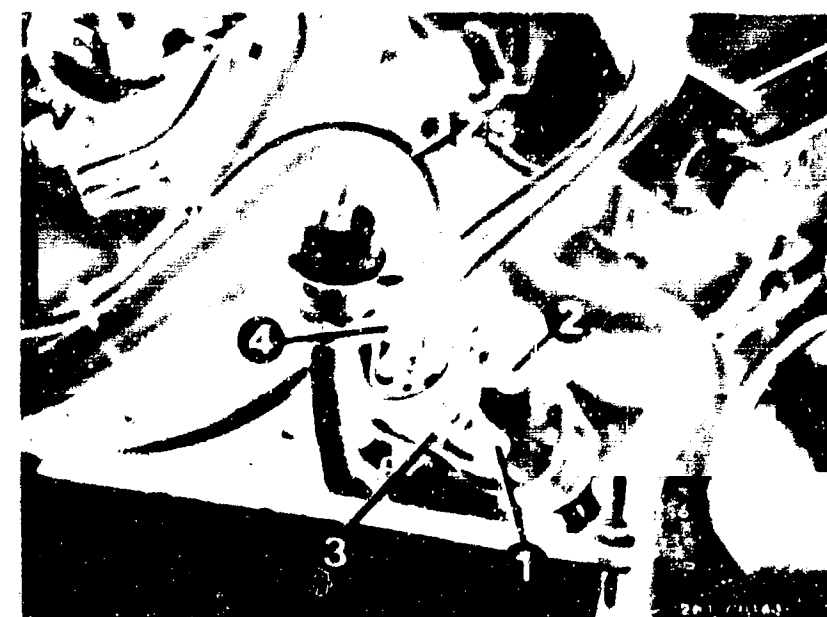
Adjusting the high-voltage distributor:

Remove distributor cap. Set flywheel to TDC (P). Bring housing notch of high-voltage distributor into alignment with center of distributor rotor.

When connecting the H.T. ignition cables, note the cylinder numbers. Do not forget screening cover. Check ignition coil primary for continuity (approx 0  $\Omega$ ). Secondary resistance: 5 to 7.2 k $\Omega$ . Test interference-suppression resistors, ignition cables and spark plugs.

Interference-suppression resistor in

Distributor rotor:	1 k $\Omega$
Distributor outer dome:	1 k $\Omega$
Distributor center dome:	1 k $\Omega$
Spark-plug connector:	5 k $\Omega$
Ignition coil:	0 k $\Omega$



High-voltage distributor

1 to 4 = Cylinder numbers

ZS = High-tension cable to ignition coil

Continued on H5/H6

**H3**

Poor throttle take-up  
Alfa Romeo Quadrifoglio



**H4**

Poor throttle take-up  
Alfa Romeo Quadrifoglio



# Poor throttle take-up (continued)

Yes

Air-flow sensor mechanically O.K.?

No

**Testing:** Open air-flow sensor flap by hand. It must be possible to open the air-flow sensor flap with uniform ease from its fully closed position to its fully open position. When released, the flap must close completely by itself. When the air-flow sensor flap is opened it must not catch at any point. Watch for any indications of abrasion or rubbing. Clean air-flow sensor if the inside is very dirty and rub out with a lint-free cloth. If there are any signs of abrasion or rubbing, replace the air-flow sensor.

Yes

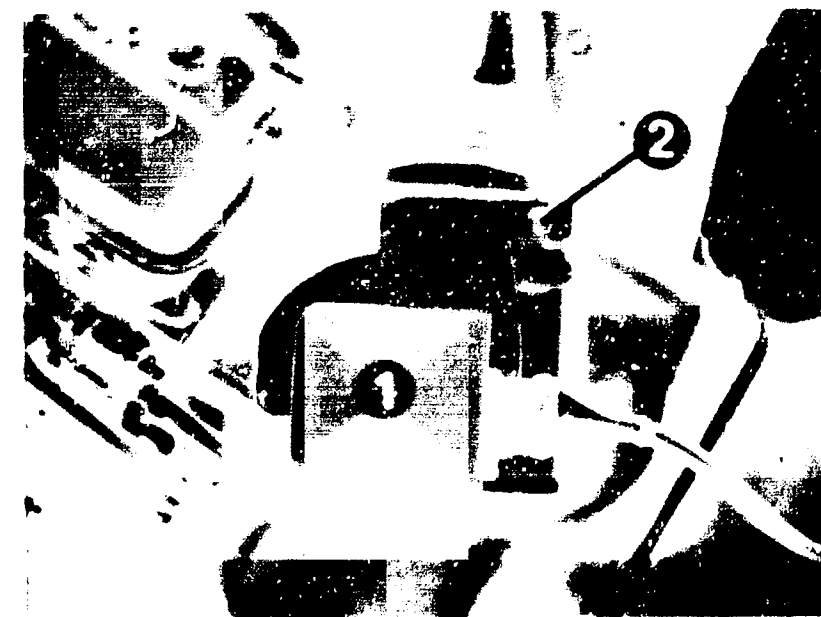
Are all hose lines and electric leads securely attached?  
Visual examination  
Is the air-intake system leak-tight?

No

Check whether hoses of air-intake system and of fuel line system are securely attached, not kinked or damaged. If necessary, replace hoses. Eliminate leaks with new seals or by re-tightening the connecting screws.  
**Leak test:** Seal off exhaust tail pipe. Open air filter and seal off air-flow sensor duct. Remove hose after auxiliary-air device and blow air (0.3 bar gauge pressure) into intake manifold with compressed-air gun. Seal off auxiliary-air device connection port.  
Open throttle valve fully when doing this. Brush or spray all joints with soapy water. Bubbling or foaming indicates a leak.  
Check electrical plug-in contacts for loose contact. Spring contacts in the connectors must not allow themselves to be pushed back.

Yes

Continued on H7/H8



1 = Air-flow sensor with NTC I  
2 = Idle-mixture-adjusting screw

H5

Poor throttle take-up  
Alfa Romeo Quadrifoglio



H6

Poor throttle take-up  
Alfa Romeo Quadrifoglio





Poor throttle take-up (continued)

Yes

Auxiliary-air device tested?

No

Testing (mechanical):

1. Visual examination of auxiliary-air device:  
Remove hoses and look down, using a small mirror. When cold, the device must be open; when the engine is warm it must be closed. If not, replace auxiliary-air device.

2. Functional test of auxiliary-air device:  
With the engine cold, pinch off hose to auxiliary-air device. Engine speed must drop. With the engine warm, pinch off hose to auxiliary-air device. Engine speed must not drop. If incorrect, replace auxiliary-air device (pay attention to direction of flow).

3. Electrical test  
Disconnect the plug of the auxiliary-air device. Connect ohmmeter to both terminals of the auxiliary-air device.

Test values:      25 ... 60  $\Omega$

If a value outside the tolerance is shown, replace the auxiliary-air device.

Yes

Continued on H9/H10



- 1 = Auxiliary-air device
- 2 = Throttle-valve switch
- 3 = Idle-speed adjusting screw

**H7**

Poor throttle take-up  
Alfa Romeo Quadrifoglio



**H8**

Poor throttle take-up  
Alfa Romeo Quadrifoglio



Poor throttle take-up (continued)

Yes

Testing completed for customer complaint

"Poor throttle take-up"

Customer complaint remedied?

No

Further possibilities:

- Customer complaint incorrectly diagnosed (See Coordinates B3...B10).  
If the fault has not been detected by "direct trouble-shooting", see "detailed trouble-shooting" (Coordinates B3/B4).
- Engine not mechanically O.K. (Compression, valve setting, valve timing, worn camshaft).

**H9**

Poor throttle take-up  
Alfa Romeo Quadrifoglio



**H10**

Poor throttle take-up  
Alfa Romeo Quadrifoglio



## Trouble-shooting program according to customer complaints

### How to use the following trouble-shooting program

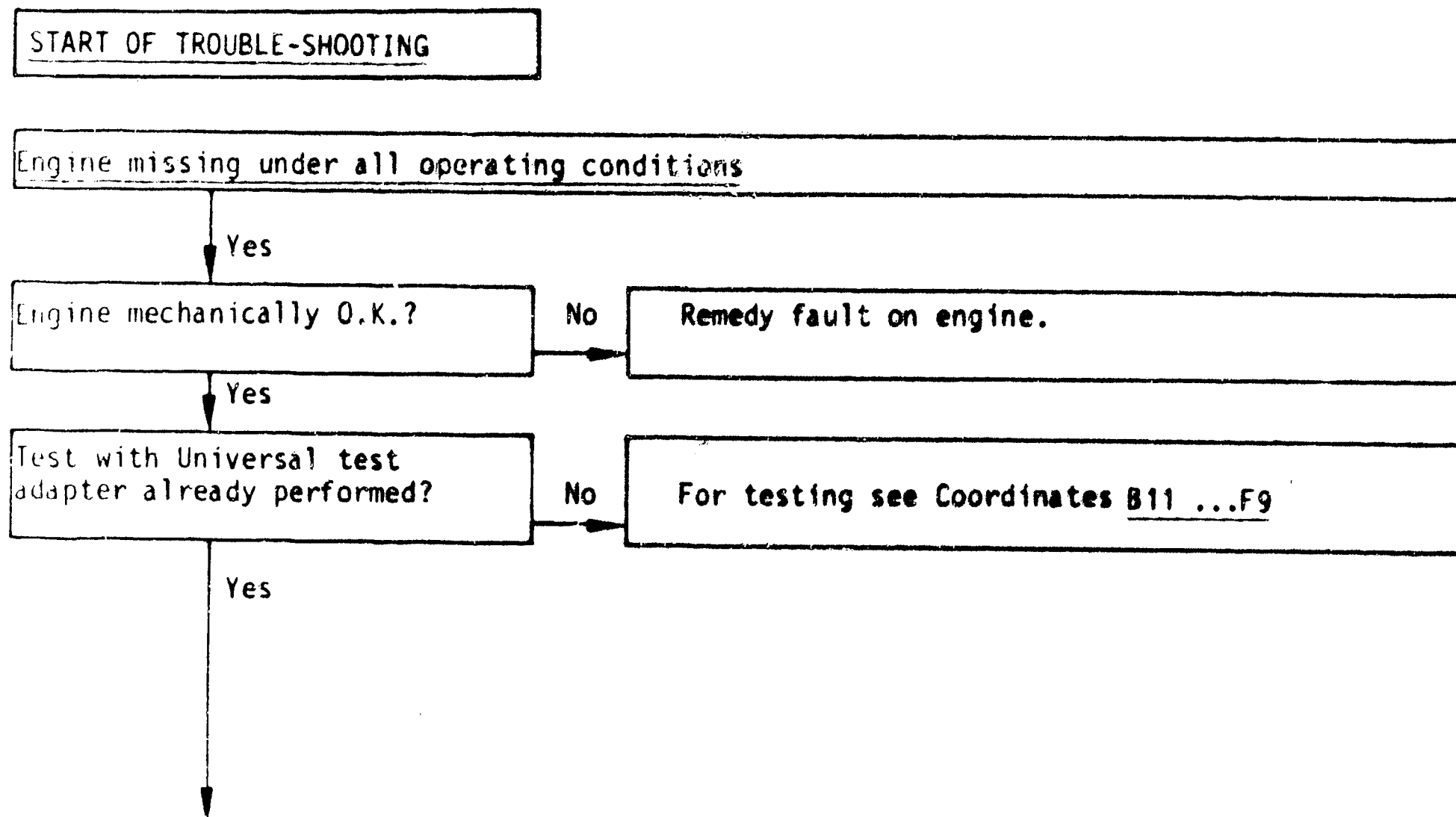
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If, on the other hand, the answer to the question is "no", and you suspect a fault, branch to the middle row of boxes and carry out the tests given there.

When you have finished testing continue trouble-shooting at the point at which you branched off.



Continued on H13/H14

**H11**

Engine missing  
Alfa Romeo Quadrifoglio



**H12**

Engine missing  
Alfa Romeo Quadrifoglio



# Engine missing under all operating conditions (continued)

Yes

Check secondary pattern of all cylinders at cranking speed. Secondary pattern O.K.?

No

Check ignition coil and high-voltage part. Check distributor cap for dirt and insulation damage.

Adjusting the high-voltage distributor:

Remove distributor cap. Set flywheel to TDC (P). Bring housing notch of high-voltage distributor into alignment with center of distributor rotor.

When connecting the H.V. ignition cables, note the cylinder numbers. Do not forget screening cover. Check ignition coil primary for continuity (approx 0  $\Omega$ ). Secondary resistance: 5 to 7.2 k $\Omega$ . Test interference-suppression resistors, ignition cables and spark plugs.

Interference-suppression resistor in

Distributor rotor:	1 k $\Omega$
Distributor outer dome:	1 k $\Omega$
Distributor center dome:	1 k $\Omega$
Spark-plug connector:	5 k $\Omega$
Ignition coil:	0 k $\Omega$

Yes

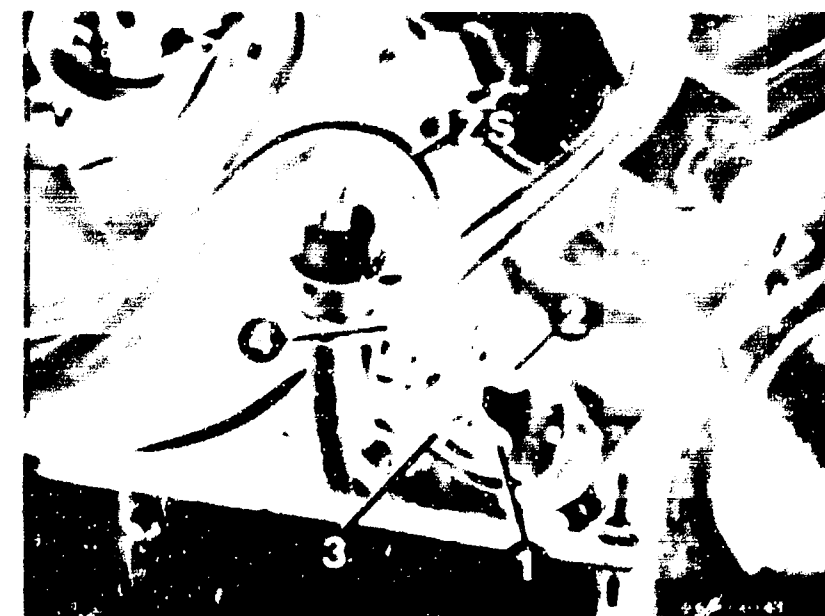
Plug-in connections of wiring harness and ground terminal O.K.?

No

Look for engine missing due to loose contacts as follows: Let the engine run, if possible on a chassis dynamometer. Keep the engine speed constant and watch for engine missing. Move the wiring harness and plug-in connections while doing this. Watch particularly for plug-in connections on engine-speed and reference-mark sensors. Ground terminal firmly secured? Check plug-in connections for security and corrosion. Spring contacts must be clipped in and must not move back. Check ground leads for continuity and loose contacts.

Yes

Continued on H15/H16



High-voltage distributor  
1 to 4 = Cylinder numbers  
ZS = High-tension cable to ignition coil

Arrows = Ground leads



H13

Engine missing  
Alfa Romeo 104 (1974-1976)



H14

Engine missing  
Alfa Romeo 104 (1974-1976)



# Engine missing under all operating conditions (continued)

Yes

Fuel delivery O.K.?

No

## Measuring the fuel delivery:

Unscrew return hose from pressure regulator. On pressure regulator, mount sufficiently long fuel hose for measuring the fuel delivery and lead into a 5 l vessel with graduated scale. Switch on fuel pump.

Test specification: min. 750 cm<sup>3</sup>/30 s

## Remedy if test specification not reached:

- Fuel filter clogged → replace
- Voltage at fuel pump plugs, with engine running min. 12 V → clean contacts; possibly also eliminate poor ground connection, replace leads.
- Fuel pressure regulator defective → replace
- Fuel pump delivery too low → replace fuel pump.

Yes

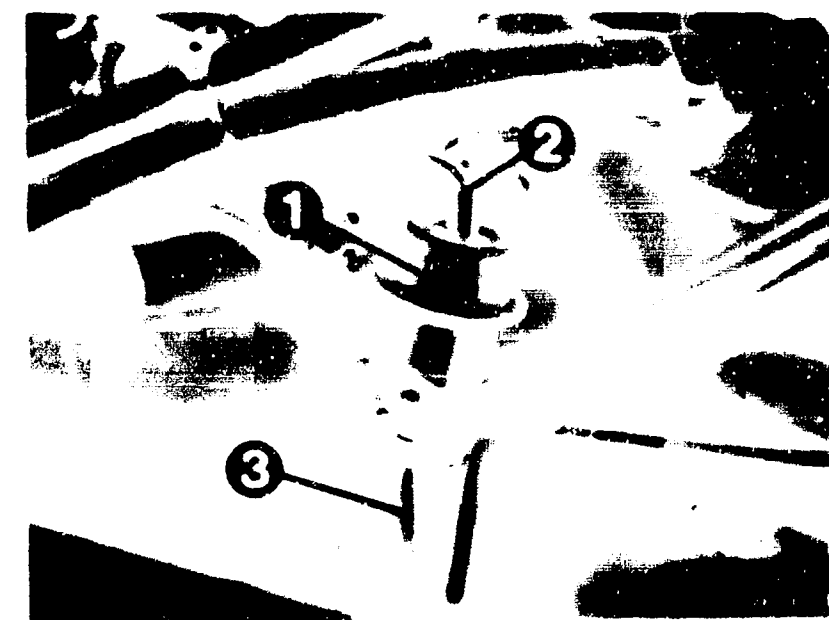
Control unit O.K.?

No

Let engine run. Shake control unit lightly and move multiple plug. Watch for engine missing. Restore plug-in connection on multiple plug or replace defective control unit.

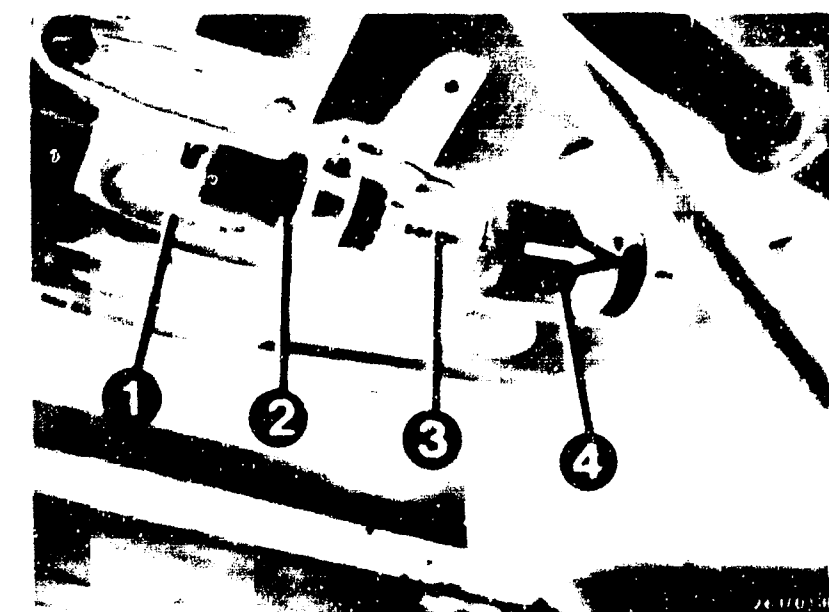
Yes

Continued on H17/H18



1 = Pressure regulator  
2 = To intake manifold  
3 = Fuel return line

1 = Fuel intake line  
2 = Electric fuel pump  
3 = Fuel delivery line  
4 = Fuel filter  
Arrow = Direction of flow



H15

Engine missing  
Alfa Romeo Quadrifoglio



H16

Engine missing  
Alfa Romeo Quadrifoglio



Engine missing under all operating conditions (continued)

Yes

Air-flow sensor O.K.?

No

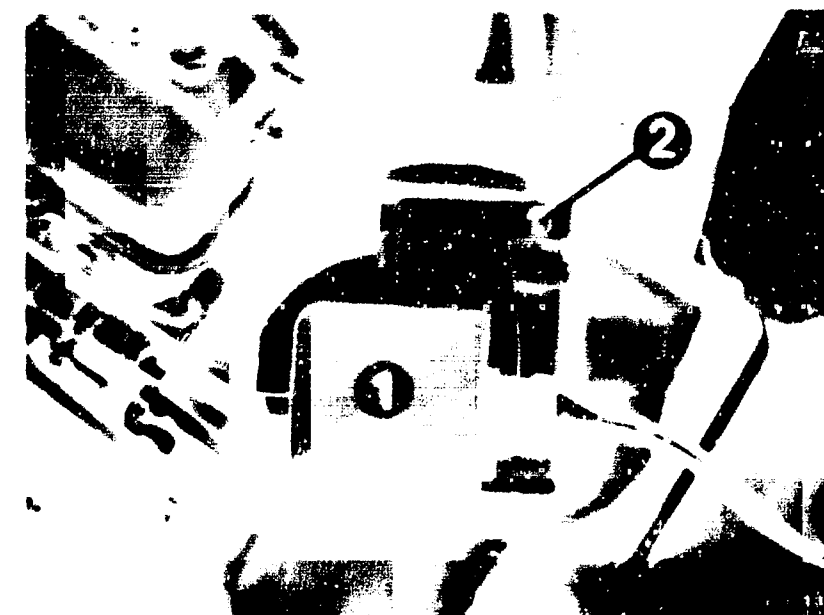
Testing: Open air-flow sensor flap by hand. It must be possible to open the air-flow sensor flap with uniform ease from its fully closed position to its fully open position. When released, the flap must close completely by itself. When the air-flow sensor flap is opened it must not catch at any point. Watch for any indications of abrasion or rubbing. Clean air-flow sensor if the inside is very dirty and rub out with a lint-free cloth. If there are any signs of abrasion or rubbing, replace the air-flow sensor.

Potentiometer test (noise test)

Remove air-flow sensor. Leave plug on. Set motortester to special input and connect using special cable to air-flow sensor term. 7 (red clip) and term. 6 (black clip). Set control stick for image adjustment on motortester as far as it will go to the left (calibrated setting). Deflect air-flow sensor flap suddenly (several times). If noise signal incorrect (see illustration) replace air-flow sensor. If air-flow sensor O.K., a continuous stroke signal must be visible on the oscilloscope. If air-flow sensor defective, there is a noise signal similar to that in the diagram. Replace air-flow sensor.

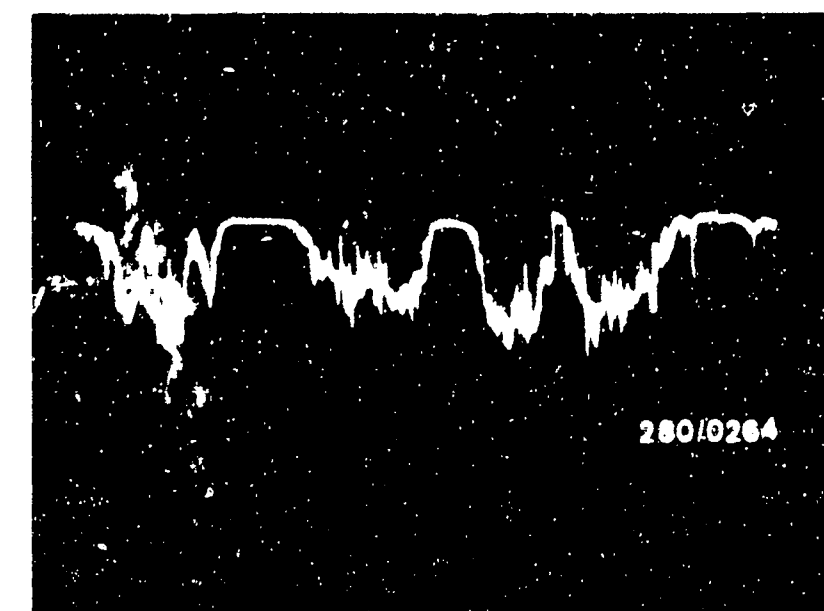
Yes

Continued on H19/H20



1 = Air-flow sensor NTC I  
2 = Idle-mixture-adjusting screw

Noise signal if air-flow sensor defective



H17

Engine missing  
Alfa Romeo Quadrifoglio



H18

Engine missing  
Alfa Romeo Quadrifoglio



Engine missing under all operating conditions (continued)

Yes

Generator with regulator O.K.?  
(Engine missing due to  
voltage peaks).

No

With the engine switched off, remove the plug from the generator.  
Start the engine. If missing stops, test generator and regulator.

Yes

Are all necessary interference-suppression devices  
installed? Check interference-suppression  
resistors. Measure resistance O.K.?

No

Ensure that interference suppression is correct.

Interference-suppression resistance in:

ignition-distributor rotor	1 k $\Omega$
ignition-distributor outer dome	1 k $\Omega$
ignition-distributor center dome	1 k $\Omega$
spark-plug connectors	3 k $\Omega$
spark plugs	approx. 5 k $\Omega$
ignition coil	0 k $\Omega$

Yes

Check spark-plug connectors  
for arcing damage. O.K.?

No

Replace spark-plug connectors.

Yes

Testing completed for  
customer complaint  
"Engine missing under all  
operating conditions".

No

Further possibilities:

- Customer complaint incorrectly diagnosed (see Coordinates B3...B10).  
If the fault has not been detected by "direct trouble-shooting", see  
"detailed trouble-shooting" (Coordinates B3/B4).

- Engine not mechanically O.K. (Compression, valve setting, valve timing,  
worn camshaft).

H19

Engine missing  
Alfa Romeo Quadrifoglio



H20

Engine missing  
Alfa Romeo Quadrifoglio



## Trouble-shooting program according to customer complaints

### How to use the following trouble-shooting program

The program is divided into 3 rows of boxes:

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2. The middle row contains descriptions of the testing and adjustment operations on the components.
3. The right-hand row contains the illustrations belonging to the text and explains the illustrations.

If the questions can be answered conclusively with "yes" without testing, proceed to the next question below.

If, on the other hand, the answer to the question is "no", and you suspect a fault, branch to the middle row of boxes and carry out the tests given there.

When you have finished testing continue trouble-shooting at the point at which you branched off.

START OF TROUBLE-SHOOTING

Fuel consumption too high

Yes

Engine mechanically O.K.?

No

Remedy fault on engine and brakes.

Yes

Test with Universal test  
adapter already performed?

No

For testing see Coordinates B11...F9

Yes

Continued on J3/J4

J1

Fuel consumption too high  
Alfa Romeo Quadrifoglio



J2

Fuel consumption too high  
Alfa Romeo Quadrifoglio





Fuel consumption too high (continued)

Yes

Check secondary pattern of all cylinders at cranking speed. Secondary pattern O.K.?

No

Check ignition coil and high-voltage part. Check distributor cap for dirt and insulation damage.

Adjusting the high-voltage distributor:  
Remove distributor cap. Set flywheel to TDC (P). Bring housing notch of high-voltage distributor into alignment with center of distributor rotor.

When connecting the H.T. ignition cables, note the cylinder numbers. Do not forget screening cover. Check ignition coil primary for continuity (approx 0  $\Omega$ ). Secondary resistance: 5 to 7.2 k $\Omega$ . Test interference-suppression resistors, ignition cables and spark plugs.

Interference-suppression resistor in

Distributor rotor:	1 k $\Omega$
Distributor outer dome:	1 k $\Omega$
Distributor center dome:	1 k $\Omega$
Spark-plug connector:	5 k $\Omega$
Ignition coil:	0 k $\Omega$

Yes

Continued on J5/J6



High-voltage distributor  
1 to 4 = Cylinder numbers  
ZS = High-tension cable to ignition coil

J3

Fuel consumption too high  
Alfa Romeo Quadrifoglio



J4

Fuel consumption too high  
Alfa Romeo Quadrifoglio



Fuel consumption too high (continued)

Yes

Air-flow sensor O.K.?

No

Testing: Open air-flow sensor flap by hand. It must be possible to open the air-flow sensor flap with uniform ease from its fully closed position to its fully open position. When released, the flap must close completely by itself. When the air-flow sensor flap is opened it must not catch at any point. Watch for any indications of abrasion or rubbing. Clean air-flow sensor if the inside is very dirty and rub out with a lint-free cloth. If there are any signs of abrasion or rubbing, replace the air-flow sensor.

Yes

Testing completed for  
customer complaint

"Fuel consumption too high".

Customer complaint  
remedied?

No

Further possibilities:

- Customer complaint incorrectly diagnosed (see Coordinates B3...B10). If the fault has not been detected by "direct trouble-shooting", see "detailed trouble-shooting" (Coordinates B3/B4).
- Engine not mechanically O.K. (Compression, valve setting, valve timing, worn camshaft).



1 = Air-flow sensor with NTC I  
2 = Idle-mixture-adjusting  
screw

J5

Fuel consumption too high  
Alfa Romeo Quadrifoglio



J6

Fuel consumption too high  
Alfa Romeo Quadrifoglio



## Trouble-shooting program according to customer complaints

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When you have finished testing continue trouble-shooting at the point at which you branched off.

START OF TROUBLE-SHOOTING

No maximum engine power / top speed not reached

Yes

Engine mechanically O.K.?

No

Remedy fault on engine

Yes

Test with Universal test  
adapter already performed?

No

For testing see Coordinates B11 ...F9

Yes

Continued on J9/J10

**J7**

No maximum engine power  
Alfa Romeo Quadrifoglio



**J8**

No maximum engine power  
Alfa Romeo Quadrifoglio



No maximum engine power / top speed not reached (continued)

Yes

Check secondary pattern of all cylinders at cranking speed. Secondary pattern O.K.?

No

Check ignition coil and high-voltage part. Check distributor cap for dirt and insulation damage.

Adjusting the high-voltage distributor:

Remove distributor cap. Set flywheel to TDC (P). Bring housing notch of high-voltage distributor into alignment with center of distributor rotor.

When connecting the H.T. ignition cables, note the cylinder numbers. Do not forget screening cover. Check ignition coil primary for continuity (approx 0  $\Omega$ ). Secondary resistance: 5 to 7.2 k $\Omega$ . Test interference-suppression resistors, ignition cables and spark plugs.

Interference-suppression resistor in

Distributor rotor:	1 k $\Omega$
Distributor outer dome:	1 k $\Omega$
Distributor center dome:	1 k $\Omega$
Spark-plug connector:	5 k $\Omega$
Ignition coil:	0 k $\Omega$

Yes

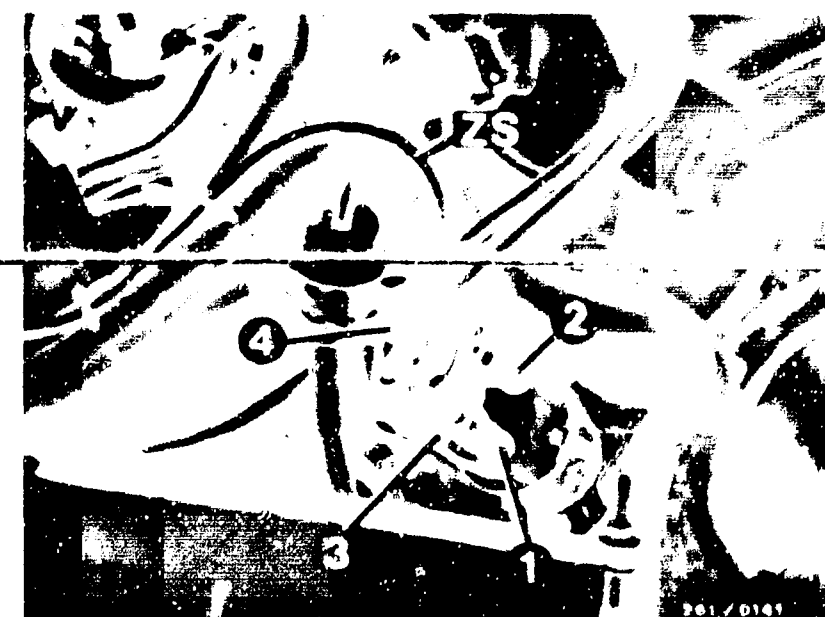
Does throttle valve open fully?

No

Throttle cable, accelerator O.K.? Accelerator may stick due to floormat etc. Adjust throttle cable.

Yes

Continued on J11/J12



High-voltage distributor

1 to 4 = Cylinder numbers

ZS = High-tension cable to ignition coil

J9

No maximum engine power  
Alfa Romeo Quadrifoglio



J10

No maximum engine power  
Alfa Romeo Quadrifoglio



No maximum engine power / top speed not reached (continued)

Yes

Fuel pressure at full load O.K.?

No

Test the fuel pressure on a chassis dynamometer at rated speed and rated power:  
Install pressure gauge into fuel inlet to fuel distribution pipe.  
Note: When opening the cap nut, pay attention to the fitted bearing.  
Collect any fuel which runs out. Danger of fire with engine hot and with sparks.

Test specification at full load:

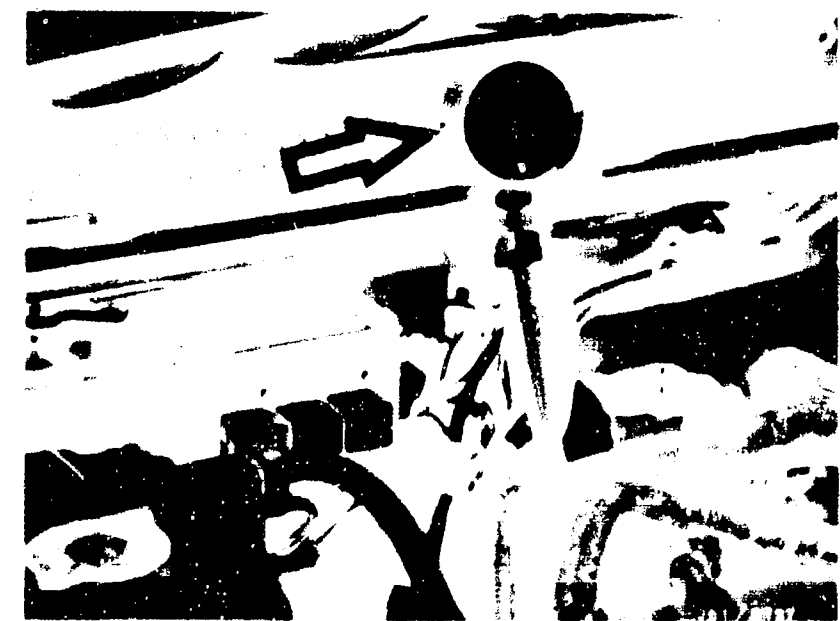
2.8 ... 3.2 bar  
(Reading may fluctuate slightly)

Remedy if test specification not reached:

- Fuel filter clogged → replace
- Voltage at fuel pump plugs, with engine running min. 12 V → clean contacts, possibly eliminate poor ground connection, replace leads.
- Fuel pressure regulator defective → replace
- Fuel pump delivery too low → replace fuel pump.
- Strainer in tank clogged? Corrosion in tank?

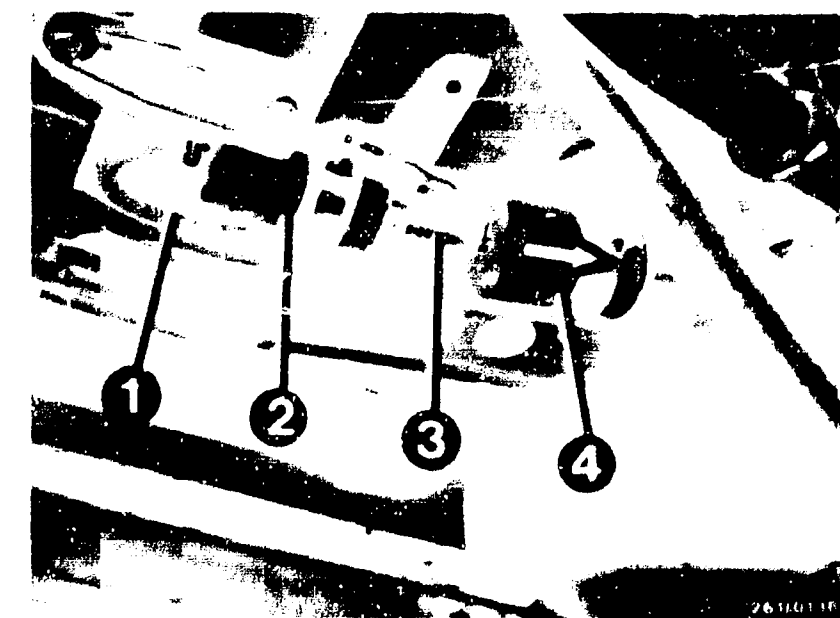
Yes

Continued on J13/J14



Arrow = Pressure gauge

1 = Fuel intake line  
2 = Electric fuel pump  
3 = Fuel delivery line  
4 = Fuel filter  
Arrow = Direction of fuel flow



J11

No maximum engine power  
Alfa Romeo Quadrifoglio



J12

No maximum engine power  
Alfa Romeo Quadrifoglio



No maximum engine power / top speed not reached (continued)

Yes

Air-flow sensor O.K.?

No

Testing: Open air-flow sensor flap by hand. It must be possible to open the air-flow sensor flap with uniform ease from its fully close position to its fully open position. When released, the flap must close completely by itself. When the air-flow sensor flap is opened it must not catch at any point. Watch for any indications of abrasion or rubbing. Clean air-flow sensor if the inside is very dirty and rub out with a lint-free cloth. If there are any signs of abrasion or rubbing, replace the air-flow sensor.

Yes

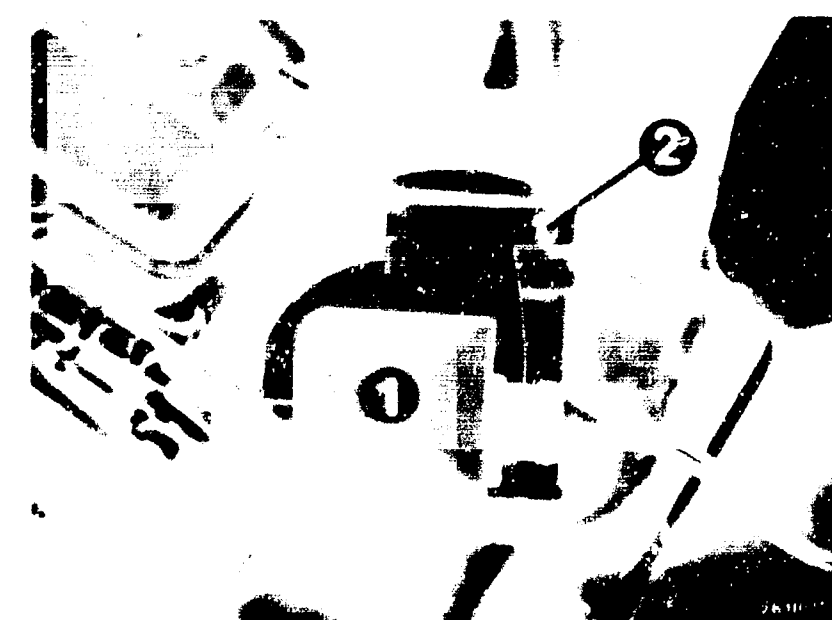
Air intake clear?

No

• Air filter clogged.

Yes

Continued on J15/J16



1 = Air-flow sensor with NTC  
2 = Idle-mixture-adjusting screw

**J13**

No maximum engine power  
Alfa Romeo Quadrifoglio



**J14**

No maximum engine power  
Alfa Romeo Quadrifoglio



No maximum engine power, top speed not reached (continued)

Yes

Fuel delivery O.K.?

No

Measuring the fuel delivery.

Unscrew return hose from pressure regulator. On pressure regulator, mount sufficiently long fuel hose for measuring the fuel delivery and lead into a 5 l vessel with graduated scale. Switch on fuel pump.

Test specification: min. 750 cm<sup>3</sup>/30 s

Remedy if test specification not reached:

- Fuel filter clogged → replace
- Voltage at fuel pump plugs, with engine running min. 12 V → clean contacts; possibly also eliminate poor ground connection, replace leads.
- Fuel pressure regulator defective → replace
- Fuel pump delivery too low → replace fuel pump.

Yes

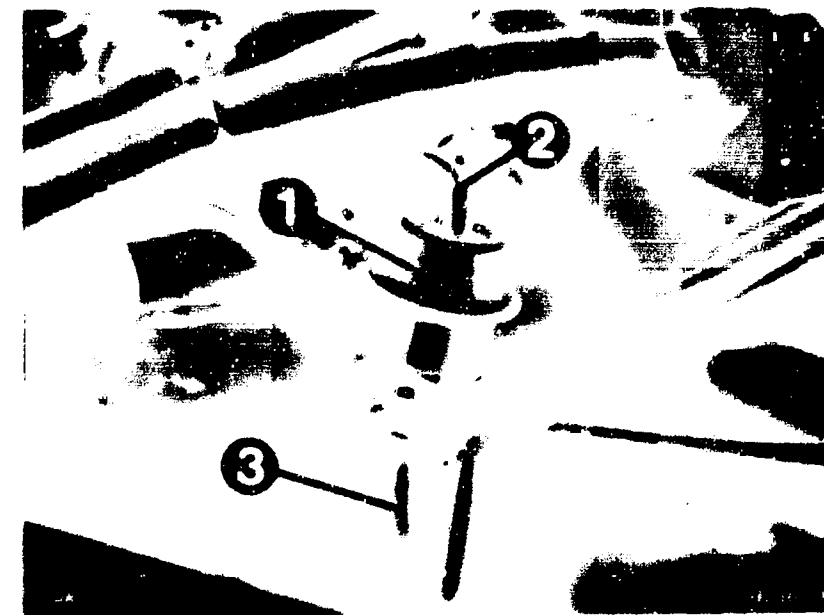
Control unit O.K.?

No

Let engine run. Shake control unit lightly and move multiple plug. Watch for engine missing. Restore plug-in connection on multiple plug or replace defective control unit.

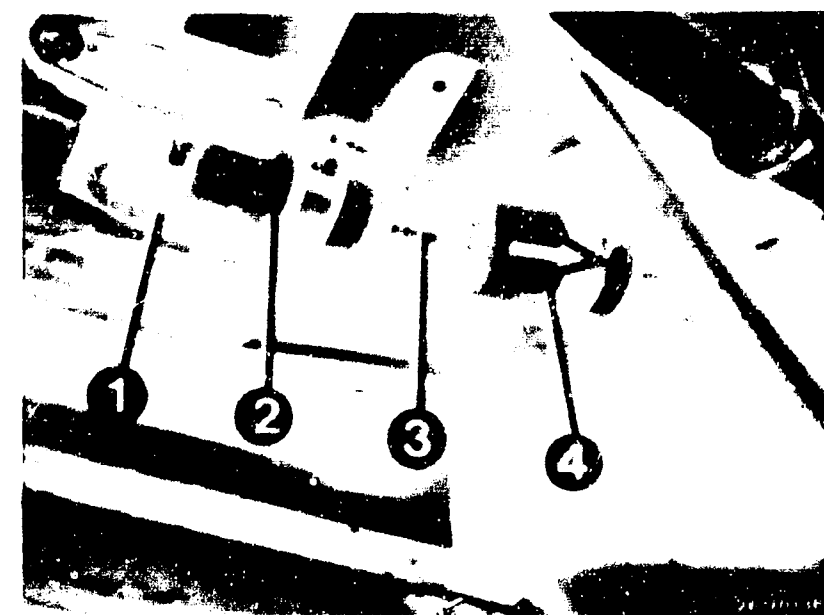
Yes

Continued on J17/J18



1 = Pressure regulator  
2 = To intake manifold  
3 = Fuel return line

1 = Fuel intake line  
2 = Electric fuel pump  
3 = Fuel delivery line  
4 = Fuel filter  
Arrow = Direction of flow



J15

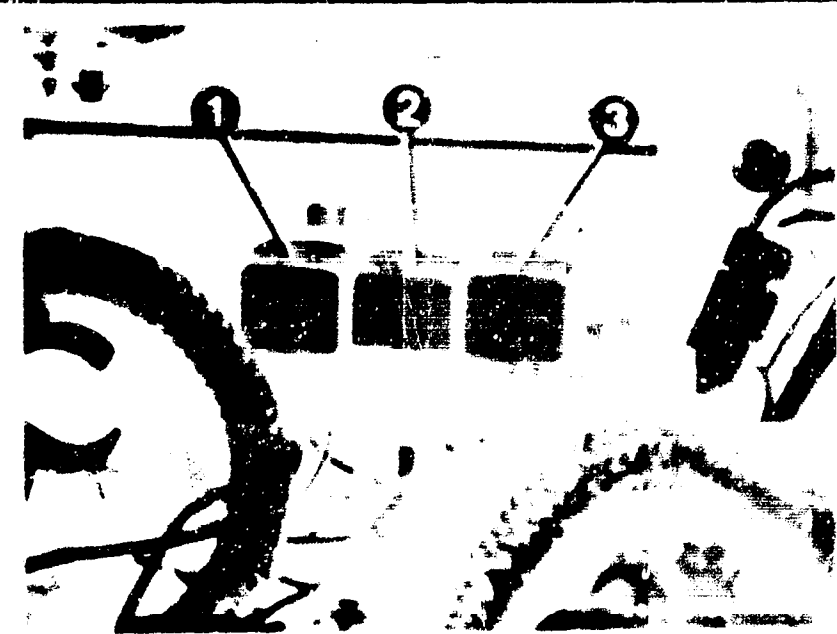
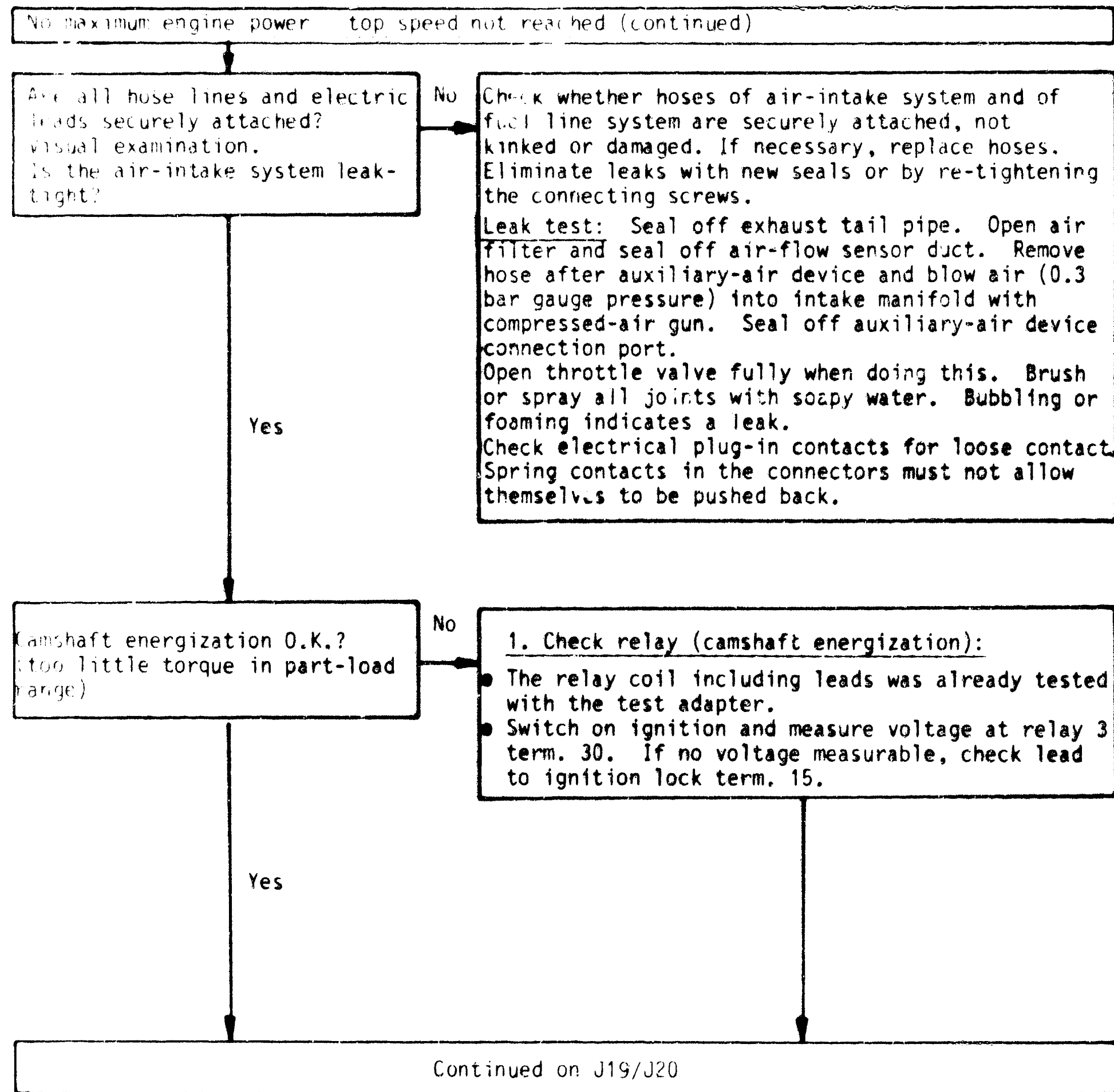
No maximum engine power  
Alfa Romeo Quadrifoglio



J16

No maximum engine power  
Alfa Romeo Quadrifoglio





1 = Relay 1 (pump relay)  
2 = Relay 2 (main relay)  
3 = Relay 3 (camshaft energization)

Arrow = Solenoid-operated valve



J17

No maximum engine power  
Alfa Romeo Quadrifoglio



J18

No maximum engine power  
Alfa Romeo Quadrifoglio





Maximum engine power/top speed not reached (continued)

yes

- Replace relay 3
- Test lead from relay 3 term. 87 to solenoid-operated valve
- 2. Test solenoid-operated valve for camshaft energization:
  - Test ground lead of solenoid-operated valve.
  - Test solenoid-operated valve winding (approx. 12 Ω).
  - Replace solenoid-operated valve.

Testing completed for customer complaint

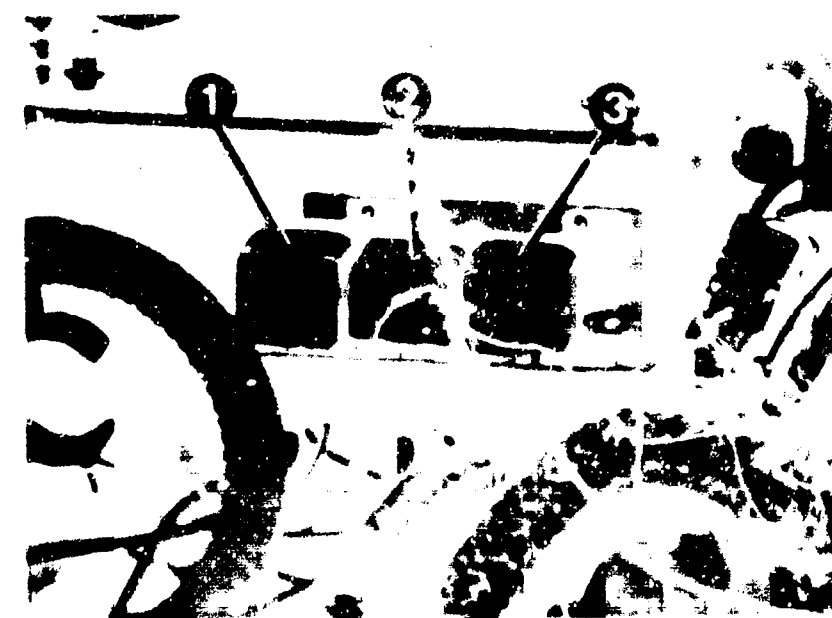
"No maximum engine power".

Customer complaint remedied?

no

Further possibilities:

- Customer complaint incorrectly diagnosed (see Coordinates B 3...B 10). If the fault has not been detected with "direct trouble-shooting", see "detailed trouble-shooting" (Coordinates B 3/B 4).
- Engine not mechanically O.K. (compression, valve setting, valve timing, worn camshaft).



- 1 = Relay 1 (pump relay)
- 2 = Relay 2 (main relay)
- 3 = Relay 3 (camshaft energization)

Arrow = Solenoid-operated valve



J 19

No maximum engine power  
Alfa Romeo Quadrifoglio



J 20

No maximum engine power  
Alfa Romeo Quadrifoglio



## Trouble-shooting program according to customer complaints

### How to use the following trouble-shooting program

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If, on the other hand, the answer to the question is "no", and you suspect a fault, branch to the middle row of boxes and carry out the tests given there.

When you have finished testing continue trouble-shooting at the point at which you branched off.

START OF TROUBLE-SHOOTING

CO adjustment at idle too low or too high

Yes

Engine mechanically O.K.?

No

Remedy fault on engine.

Yes

Test with universal test  
adapter already performed?

No

For testing see Coordinates B11...F9

Yes

Continued on K3/K4

K1

CO adjustment

Alfa Romeo Quadrifoglio



K2

CO adjustment

Alfa Romeo Quadrifoglio



# CO adjustment at idle too low or too high (continued)

Yes

Check secondary pattern of all cylinders at cranking speed. Secondary pattern O.K.?

No

Check ignition coil and high-voltage part. Check distributor cap for dirt and insulation damage.

Adjusting the high-voltage distributor:

Remove distributor cap. Set flywheel to TDC (P). Bring housing notch of high-voltage distributor into alignment with center of distributor rotor.

When connecting the H.T. ignition cables, note the cylinder numbers. Do not forget screening cover. Check ignition coil primary for continuity (approx 0  $\Omega$ ). Secondary resistance: 5 to 7.2 k $\Omega$ . Test interference-suppression resistors, ignition cables and spark plugs.

Interference-suppression resistor in

Distributor rotor:	1 k $\Omega$
Distributor outer dome:	1 k $\Omega$
Distributor center dome:	1 k $\Omega$
Spark-plug connector:	5 k $\Omega$
Ignition coil:	0 k $\Omega$

Yes

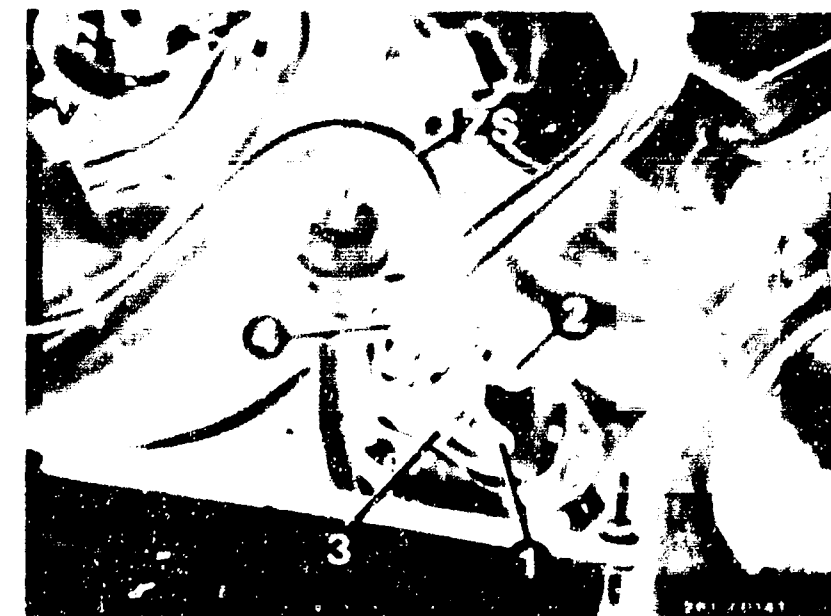
Air-flow sensor O.K.?

No

Testing: Open air-flow sensor flap by hand. It must be possible to open the air-flow sensor flap with uniform ease from its fully closed position to its fully open position. When released, the flap must close completely by itself. When the air-flow sensor flap is opened it must not catch at any point. Watch for any indications of abrasion or rubbing. Clean air-flow sensor if the inside is very dirty and rub out with a lint-free cloth. If there are any signs of abrasion or rubbing, replace the air-flow sensor.

Yes

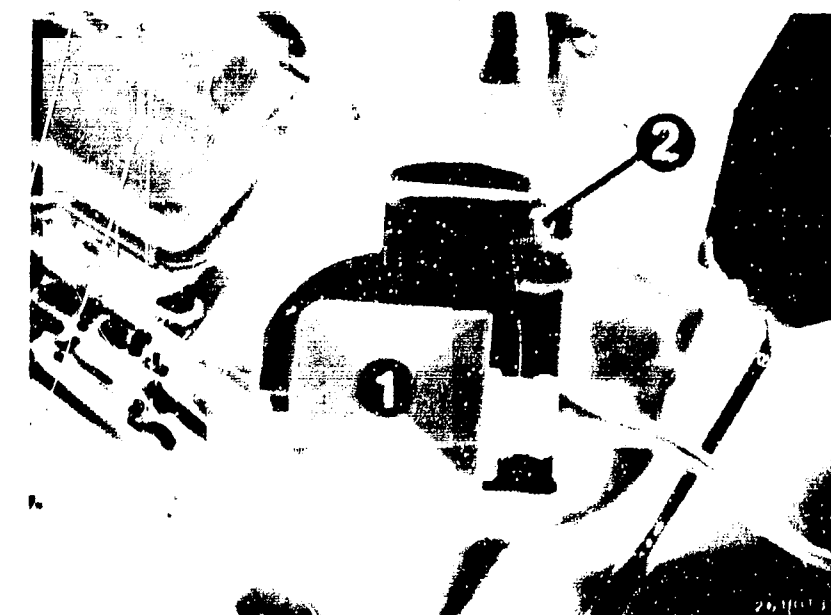
Continued on K5/K6



High-voltage distributor

1 to 4 = Cylinder numbers  
ZS = High-tension cable to ignition coil

1 = Air-flow sensor with NTC I  
2 = idle-mixture-adjusting screw



K3

CO adjustment

Alfa Romeo Quadrifoglio



K4

CO adjustment

Alfa Romeo Quadrifoglio



CO adjustment at idle too low or too high (continued)

Yes

Are all hose lines and electric leads securely attached?  
Visual examination.  
Is the air-intake system leak-tight?

No

Check whether hoses of air-intake system and of fuel line system are securely attached, not kinked or damaged. If necessary, replace hoses. Eliminate leaks with new seals or by re-tightening the connecting screws.

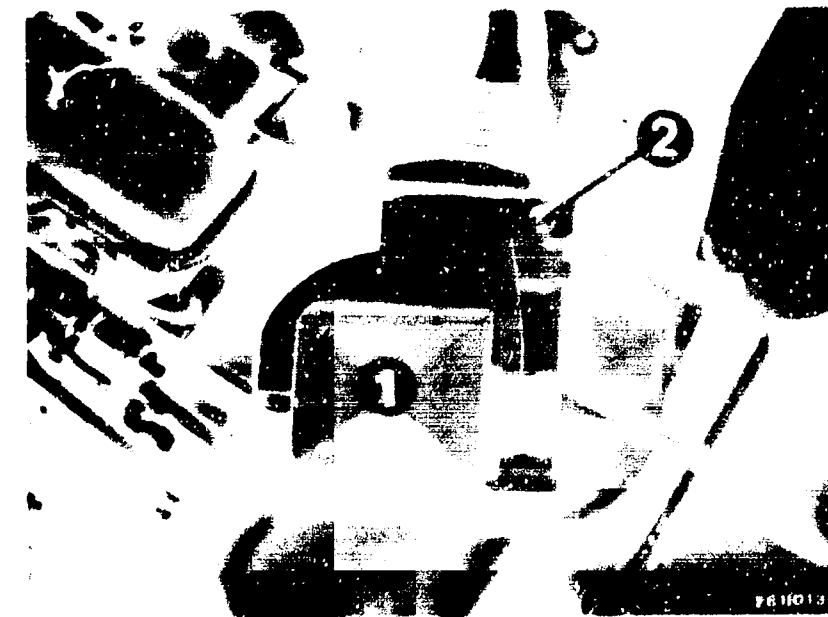
Leak test: Seal off exhaust tail pipe. Open air filter and seal off air-flow sensor duct. Remove hose after auxiliary-air device and blow air (0.3 bar gauge pressure) into intake manifold with compressed-air gun. Seal off auxiliary-air device connection port.

Open throttle valve fully when doing this. Brush or spray all joints with soapy water. Bubbling or foaming indicates a leak.

Check electrical plug-in contacts for loose contact. Spring contacts in the connectors must not allow themselves to be pushed back.

Yes

Continued on K7/K8



- 1 = Air-flow sensor with NTC
- 2 = Idle-mixture-adjusting screw

K5

CO adjustment

Alfa Romeo Quadrifoglio



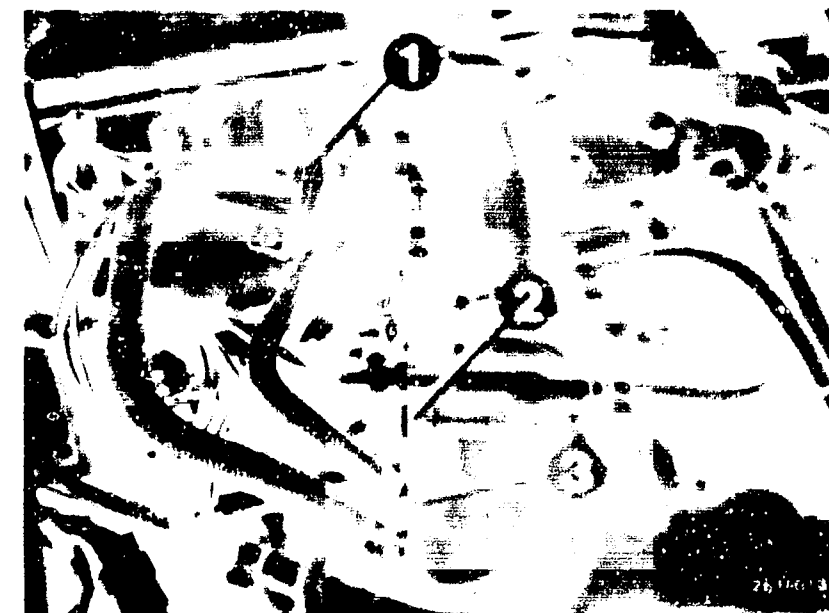
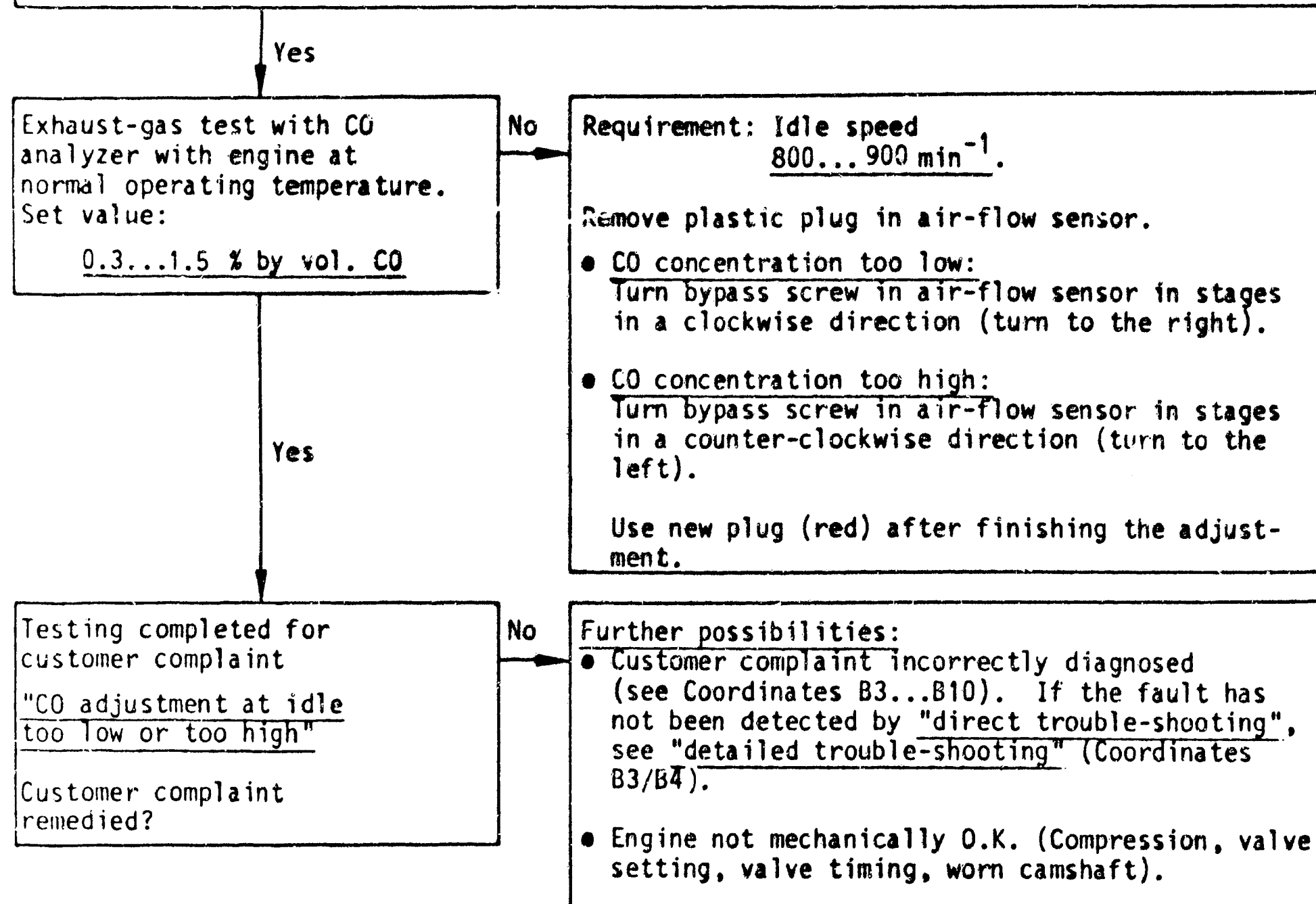
K6

CO adjustment

Alfa Romeo Quadrifoglio



CO adjustment at idle too low or too high (continued)



1 = Auxiliary-air device  
2 = Throttle-valve switch  
3 = Idle-speed adjusting screw

1 = Air-flow sensor with NTC 1  
2 = Idle-mixture-adjusting screw



K7

CO adjustment  
Alfa Romeo Quadrifoglio



K8

CO adjustment  
Alfa Romeo Quadrifoglio



## Technical Bulletin

It is to be understood that the above information is not to be communicated to any third party.

En A. A. 100 335 411 2.11

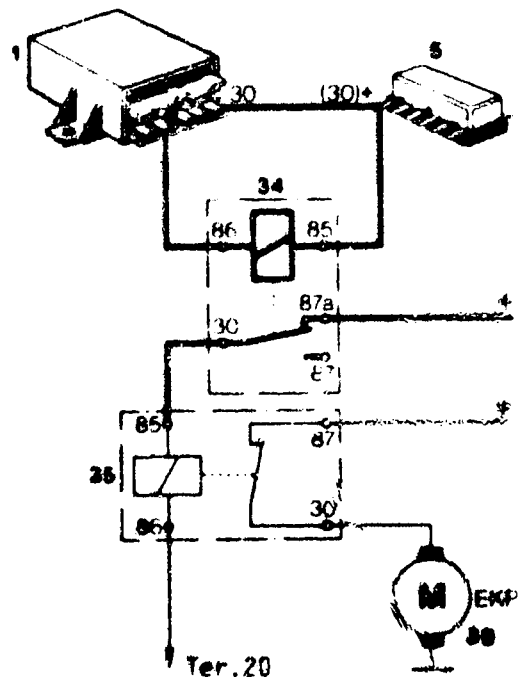
replaced with Metronite

VDI-1-33b/110 En

10.1981

When the engine (e.g. 235 411 901) was fitted at a later stage into a vehicle with a Motronic equipped engine (e.g. BMW and Porsche), we used to recommend switching off the voltage supply of the Motronic control unit as a means of protection against theft. Please do not use this circuit any more. It will be replaced by the new, new circuit in which the electric fuel-pump relay is switched off via the alarm system.

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- alarm relay  
fuse box  
additional relay 0 332 204 150  
(formerly 0 332 204 125)  
electric fuel-pump relay  
electric fuel-pump  
cable to terminal 20 on  
Metronic control unit

# BOSCH

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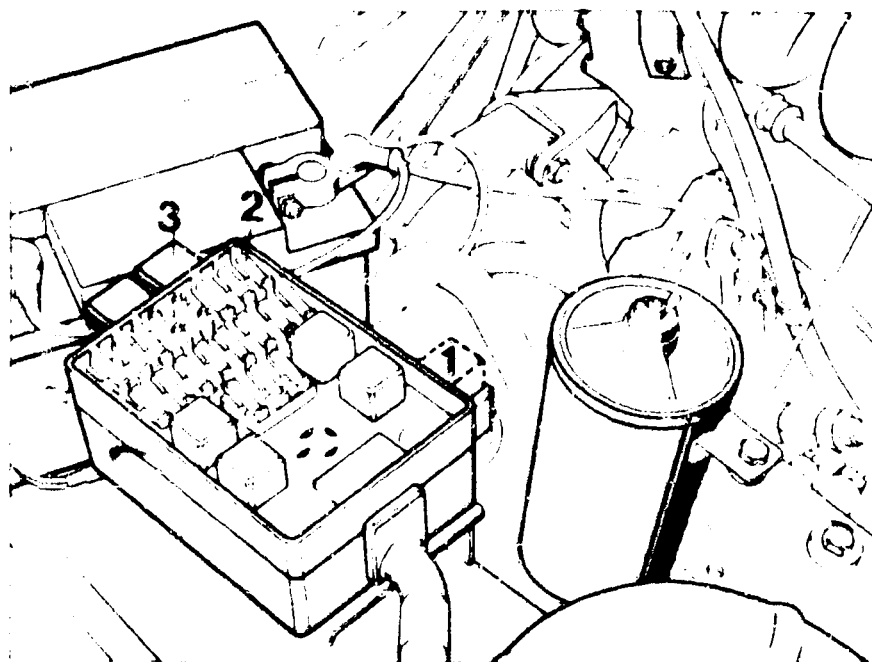
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## Technical Bulletins

Alfa Romeo Quadrifoglio

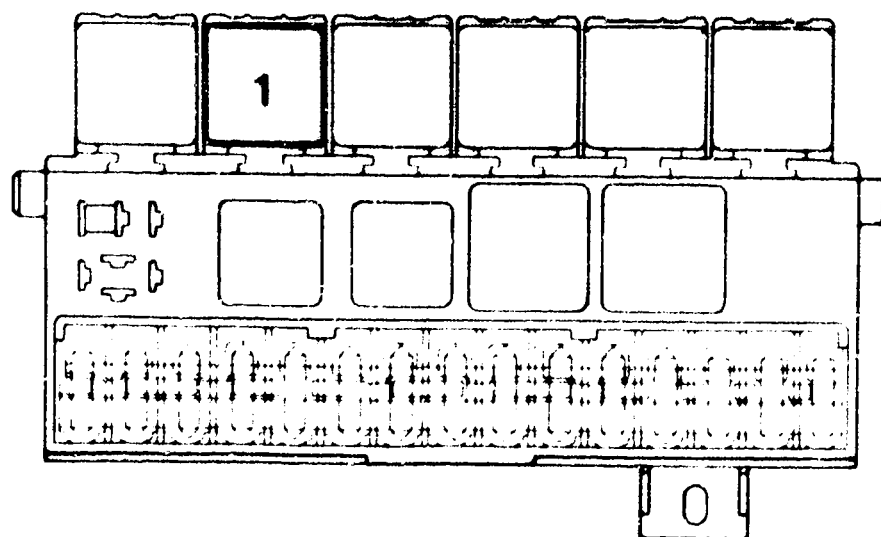


Mounting position of the relay for the electric fuel-pump in BMW vehicles



- 1 = electric fuel-pump relay (position until 8.1980)
- 2 = fuse (16 A) for electric fuel-pump
- 3 = electric fuel-pump relay (position as from 8.1980)

Mounting position of the relay for the electric fuel-pump in Porsche vehicles



- Central electrics
- 1 = electric fuel-pump relay



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## 11. Trouble shooting program according to customer complaints

### Customer complaint:

Starting motor operates, engine fails to start or starts only with great

difficulty.....	F 10	-	F 23
Secondary patterns.....	F 12	-	F 13
Injection valves.....	F 12	-	F 17
Auxiliary-air device.....	F 18	-	F 19
Air-flow sensor.....	F 20	-	F 21
Hose lines, electric lead connections and leak test.....	F 20	-	F 21

### Customer complaint:

Engine starts but then dies.....	G 1	-	G 8
Hose lines, electric lead connections and leak test.....	G 3	-	G 4
Auxiliary-air device.....	G 5	-	G 6
Air-flow sensor.....	G 7	-	G 8

### Customer complaint:

Uneven engine idle.....	G 9	-	G 22
Secondary patterns.....	G 11	-	G 12
Air-flow sensor.....	G 11	-	G 12
Hose lines, electric lead connections and leak test.....	G 13	-	G 14
Auxiliary-air device.....	G 15	-	G 16
Start valves.....	G 17	-	G 20
Engine-speed and CO adjustment.....	G 21	-	G 22



Customer complaint:

Poor throttle take-up.....	H	1	-	H	10
Secondary patterns.....	H	3			
Air-flow sensor.....	H	5			
Hose lines, electric lead connections and leak test.....	H	5			
Auxiliary-air device.....	H	7			

Customer complaint:

Engine missing under all operating conditions.....	H	11	-	H	20
Secondary patterns.....	H	13			
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Customer complaint:

Fuel consumption too high.....	J	1	-	J	6
Secondary patterns.....	J	3	-	J	4
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Customer complaint:

No maximum engine power/top speed not reached.....	J	7	-	J	20
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Throttle-valve adjustment.....	J	9	-	J	10
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Customer complaint:

CO adjustment at idle too low or

too high.....K 1 - K 2

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Air-flow sensor.....K 3 - K 4

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and leak test.....K 5 - K 6

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